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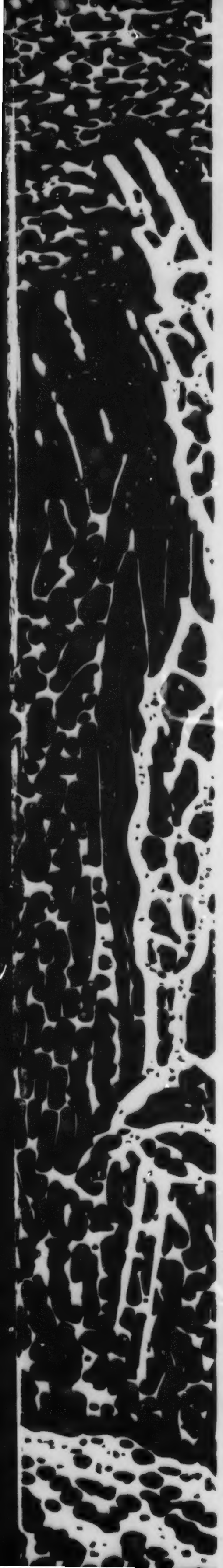

GUIDE TO CROP PROTECTION 2001

- WEEDS
- PLANT DISEASES
- INSECTS

Manitoba
Agriculture
and Food

THIS PUBLICATION IS ONLY A GUIDE. ALWAYS REFER TO THE PRODUCT LABEL FOR APPLICATION DETAILS AND PRECAUTIONS.

Crop Protection Companies

Valent BioSciences
www.valent.com
1-800-898-2536

Aventis CropScience
www.ca.cropscience.aventis.com
1-800-667-5959

BASF
www.agproducts.basf.com
1-877-371-2273

Bayer
1-877-938-3737

Cheminova
1-888-316-6260

Degesch America Inc.
1-800-330-2525

Dow AgroSciences
www.dowagro.ca
1-800-667-3852

Dupont
www.dupont.ca/ag/
1-800-667-3925

Engage Agro
www.engageagro.com
1-800-900-5487

Gustafson
www.gustafson.ca
1-800-880-9481

Hedley Technologies
www.hedleytech.com
1-888-476-4473

IPCO
(204) 233-3461

Monsanto
www.farmcentral.com
1-800-667-4944

Norac Concepts
www.noracconcepts.com
(613) 841-2907

Nufarm
www.amitrol.com
1-800-868-5444

Peacock Industries
(306) 225 4691

Rohm & Haas
www.rohmhaas.com
1-800-205-7766

Syngenta
www.syngenta.ca
1-800-665-9250

United Agri Products
www.uap.ca
1-800-561-5444

Van Waters & Rogers
www.vwr-ltd.com
1-800-665-8888

For more information on weeds, diseases and insects, visit the Manitoba Agriculture and Food website at www.gov.mb.ca/agriculture/

Manitoba Agricultural Representative Offices

Central Region

Altona	204-324-6871	Pilot Mound	204-825-2858
Carman	204-745-5610	Portage la Prairie	204-239-3353
Gladstone	204-385-2856	Somerset	204-744-2013
Morden	204-822-5461	Starbuck	204-735-4080
Morris	204-746-2312	Treherne	204-723-2626

Regional Agronomist 204-744-4050 (Somerset)

Eastern/Interlake Region

Arborg	204-376-3301	Selkirk	204-785-5012
Ashern	204-768-2686	St. Pierre-Jolys	204-433-7749
Beausejour	204-268-6012	Steinbach	204-346-6086
Dugald	204-853-2051	Stonewall	204-467-5511
Fisher Branch	204-372-6526	Teulon	204-886-2696
Lundar	204-762-5649	Vita	204-425-3436

Regional Agronomist 204-376-3307 (Arborg)

Northwest Region

Dauphin	204-622-2008	Ste. Rose du Lac	204-447-2116
Ethelbert	204-742-3779	Swan River	204-734-3417
Roblin	204-937-2158	The Pas	204-627-8255
Russell	204-773-2043		

Regional Agronomist 204-622-2009 (Dauphin)

Southwest Region

Boissevain	204-534-2461	Melita	204-522-3256
Brandon	204-726-6384	Minnedosa	204-867-3961
Carberry	204-834-3349	Neepawa	204-476-2311
Deloraine	204-747-3045	Shoal Lake	204-759-2394
Hamiota	204-764-2767	Souris	204-483-2153
Killarney	204-523-4510	Virden	204-748-3873

Regional Agronomist 204-726-6385 (Brandon)

Manitoba Weed Supervisor Offices

Central Region

Baldur	(M/Th)	204-535-2527	
Carman		204-745-2575	
Cartwright	(T/Th)	204-529-2363	
Crystal City	(M/W/F)	204-873-2103	
Gladstone		204-385-2856	
Holland	(am)	204-526-2732	(pm) 204-723-2626
Portage la Prairie		204-857-4439	
MacGregor		204-685-2050	
Manitou		204-242-2681	
Miami		204-435-2114	
Morris		204-746-2571	
Sanford		204-736-2331	
Somerset	(T/W/F)	204-744-2049	

Eastern/Interlake Region

Arborg	204-376-3313	St. Pierre-Jolys	204-433-7265
Beausejour	204-268-6010	Steinbach	204-346-6093
Dominion City	204-427-2158	Stonewall	204-467-2256
Dugald	204-853-2051	Vita	204-425-3436
Selkirk	204-785-5036	Whitemouth	204-348-7138

Northwest Region

Dauphin	204-638-7050

Southwest Region

Brandon	204-725-8683	Hartney	204-858-2590
Carberry	204-834-3302	Killarney	204-523-4205
Deloraine	204-747-2586	Neepawa	204-476-5162
Douglas	204-763-4764	Pierson	204-634-2419
Glenboro	204-827-2602	Reston	204-877-3768
Hamiota	204-764-2128	Virden	204-748-3873

EMERGENCY NUMBERS

POISON CONTROL CENTRE
1-204-787-2591

PESTICIDE SPILL LINE
1-204-945-4888

Prepared by Manitoba Agriculture and Food in co-operation with Saskatchewan Agriculture and Food.

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Table 1: Metric Conversion Factors* (Approximate)

Metric Unit	*Metric to Imperial Multiply By*	*Imperial Unit*	*Imperial to Metric Multiply By*	*Metric Unit*
LINEAR				**LINEAR**
centimetre (cm)	x 0.39	inch	x 2.54	centimetre (cm)
AREA				**AREA**
square metre (m^2)	x 1.2	square yard	x 0.84	square metre (m^2)
hectare (ha)	x 2.5	acres	x 0.4	hectare (ha)
VOLUME				**VOLUME**
litre (L)	x 0.22	gallon	x 4.55	litre
PRESSURE				**PRESSURE**
kilopascals (kPa)	x 0.14	psi	x 6.9	kilopascals (kPa)
WEIGHT				**WEIGHT**
gram (g)	x 0.04	oz	x 28.35	gram (g)
kilogram (kg)	x 2.2	lb	x 0.454	kilogram (kg)
AGRICULTURAL				**AGRICULTURAL**
litres per hectare (L/ha)	x 0.089	gallons/acre	x 11.23	litres per hectare (L/ha)
litres per hectare (L/ha)	x 0.357	quarts/acre	x 2.81	litres per hectare (L/ha)
litres per hectare (L/ha)	x 0.71	pints per acre	x 1.41	litres per hectare (L/ha)
millilitres per hectare (mL/ha)	x 0.014	fl.oz per acre	x 70.22	millilitres per hectare (mL/ha)
kilograms per hectare (kg/ha)	x 0.89	lb per acre	x 1.12	kilograms per hectare (kg/ha)
grams per hectare (g/ha)	x 0.014	oz/acre	x 70	grams per hectare (g/ha)

*EXAMPLE: To convert centimetres to inches, multiply by 0.39; conversely, to convert inches to centimetres, multiply by 2.54. CAUTION: Herbicide labels are in metric units only. Conversion between the Metric and Imperial system may result in confusion. It is recommended to use metric units only.

Guide to Crop Protection 2001

For Reference Until December 31, 2001

This publication is updated annually and replaces
the 2000 and previous issues.

Introduction

How to Use This Book

This publication is only a guide. Always refer to the product label for application details and precautions.

The *Guide to Crop Protection* is divided into 3 sections: (1) Weed Control; (2) Plant Disease Control; and (3) Insect Control.

To use the information in each of these sections, use the following process:

1. Turn to the charts at the beginning of each section. There is a set of charts for weeds, plant diseases and insect control. Select the chart for the crop you want or plan to grow. Use the chart to match your weed, disease or insect problems with the products available for that crop.
2. Once you have narrowed your product choices down to a few candidates, go to the recommendation section for that product. Products are listed alphabetically. Read the recommendations thoroughly for each product you are considering.
3. Read the product label attached to the container for detailed instructions on application.

This publication is intended to be used as a guide only. Information contained herein is that available at time of printing. While every effort has been made to ensure accuracy, the provincial government does not accept responsibility for label changes. When more than one trade name is listed, not all weeds or tank mixes may appear on all labels. Consult product labels attached to pesticide containers for final detailed instructions.

Certain recommendations in this publication are given in quantity of commercial product per acre (L or kg/acre). Product labels are given in quantity of product per hectare (L or kg/ha). To avoid application errors be sure to read and understand label recommendations.

The *Guide to Crop Protection* includes the most recent recommendations for weed, plant disease and insect control in field and forage crops. These recommendations are based on the uses registered under the Pest Management Regulatory Agency's *Pest Control Products Act*. It is an offence under *The Pest Control Products Act* to apply any chemical in a manner not consistent with the product label. If you have any doubts regarding the instructions in this publication, or on the product label, contact the company representative, your local agricultural office or the Pest Management Regulatory Agency for further advice.

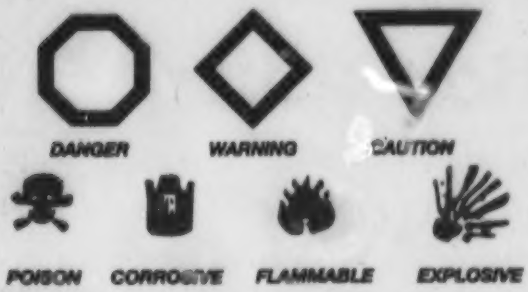
Safe Use of Herbicides, Fungicides and Insecticides

Herbicides, fungicides and insecticides are classified according to the use hazard and risk involved. The categories of hazard are:

- toxicity
- flammability
- explosive potential
- corrosivity

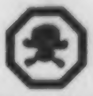
The degree of risk is represented by symbols taken from common traffic sign shapes represented by the stop, caution and yield signs. The signal word for each of the signs is danger (high risk), warning (moderate risk) and caution (low risk). Where the risk is minimal, no designation is required. The label on the container will carry the appropriate signs for the protection of the user. Degree of risk symbols for herbicides, insecticides and fungicides used in field and forage crops are included in the product directory. The symbols are illustrated in Figure 1.

Figure 1. Degree of Risk and Hazard Symbols

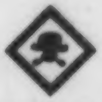


LD_{50} values are used to rate the toxicity of pesticides. The LD_{50} refers to the dose of pesticide (in mg per kg of the test animal's body weight) that is lethal to 50 percent of the group of test animals. For example, if a pesticide has an LD_{50} value of 10 mg/kg, and the test animals each weigh 1 kg, then 50 percent of the animals would die if they each ate 10 mg of the pesticide.

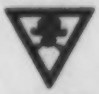
Table 2. Oral LD_{50} Values as they relate to the Risk/Hazard Symbols



DANGER POISON
LD_{50} less than 500 mg/kg
indicates high toxicity



WARNING POISON
LD_{50} 500-1,000 mg/kg
indicates moderate toxicity



CAUTION POISON
LD_{50} 1,000-2,500 mg/kg
indicates low toxicity

SYMBOL ABSENT
LD_{50} greater than 2,500 mg/kg
indicates very low toxicity

Different types of protective equipment are required for pesticides that differ in toxicity. Special equipment requirements are described on the product label, but in general the following precautions must be taken when using pesticides of different hazard ratings.

Danger Poison - requires goggles, respirator, gloves and skin protection, avoid fumes and spray mist.

Warning Poison - requires goggles, gloves and skin protection, avoid fumes and spray mist.

Caution Poison - requires gloves and skin protection, avoid fumes and spray mist.

The absence of a hazard symbol on a pesticide label indicates low toxicity to mammals. Nevertheless, protective clothing should be worn when using pesticides that do not have a hazard symbol.

Protecting Yourself from Exposure to Herbicides, Fungicides and Insecticides

The use of protective equipment and sound safety procedures will help minimize your exposure to herbicides, fungicides and insecticides. Follow the 10 rules for safe application listed below, and wear the safety equipment recommended.

10 Rules for Safe Application

1. Never smoke or eat while applying pesticides.
2. Avoid inhaling sprays or dusts. Wear protective clothing and a respirator.
3. Sprayer lines carrying chemicals should not enter the operator's cab.
4. Have soap, water and a towel available. Should concentrated product spill on skin, hands, face or eyes, wash immediately.
5. Wash hands and face when leaving the treated area, before break periods, lunch or urination.
6. Bathe or shower and change into clean clothing after working with pesticides. Wash clothing each day before re-use.
7. Call a physician or get the patient to a hospital immediately if symptoms of illness occur during or shortly after pesticide application. Be sure to take along the product label or container.
8. Store pesticides out of reach of children and where there is no chance of contact with human food or livestock feeds. Do not store herbicides with insecticides and avoid cross-contamination. Storage areas should be locked.
9. Keep chemicals in their original containers, never in unmarked containers or bottles used for food or drink.
10. Follow proper container disposal methods. All containers should be triple rinsed or pressure rinsed, punctured to render the container non-reusable, and delivered to designated disposal sites.

Protective Clothing

Wear protective equipment as described in the chart to reduce exposure.

EQUIPMENT	PROTECTION	HOW TO WEAR IT
Coveralls	There are two types of coveralls: disposable and reusable. Disposable coveralls are lightweight and comfortable on warm days. They can be worn for mixing and applying pesticides, then discarded at the day's end. If they become contaminated, they should be discarded at once. The second type of coverall is made of washable fabric and may be reused many times. These fabric coveralls are adequate for use with all but the most highly toxic and concentrated pesticides.	Button (or zip) right up to the neck. Loose coveralls around the neck will suck and blow pesticide in and out of the interior of the coveralls as you bend and move. Wear coveralls over a long-sleeved shirt and pants.
Aprons	When pouring or otherwise handling concentrated pesticides, it makes good sense to wear protection in the form of an apron. The apron protects the front of your body from spills or splashes of the concentrate. The apron should be made of rubber or synthetic liquid-proof material that will resist the solvents used in formulating the pesticide.	Make sure the apron covers your body from your chest to your boots.
Gloves	Protect your hands by wearing chemical-resistant gloves. Neoprene gloves provide the best protection. Natural rubber gloves may be used when handling organo-phosphorus or carbamate pesticides. Be sure that they are designed for use with solvents and pesticides. Never use lined gloves, gloves with wristbands or leather gloves.	Put gloves on and roll up the first inch or two of the cuff. That way when you lift your hands, any liquid on the gloves won't drip down your arms.
Hats	Use a chemical-resistant hat, preferably made of washable plastic. The hat may be a hard hat or made of flexible plastic. In either case, it should have a plastic sweatband. Wash and dry entire hat after each use and before storing. Ordinary baseball caps with cloth sweatbands are dangerous as they absorb the pesticide and recontaminate the forehead each time you wear them. Even small amounts of moderately or slightly toxic pesticides may cause severe skin irritation or other illness if exposure continues for several days.	
Boots	Wear chemical-resistant, unlined boots. These boots are available in a variety of styles and materials. Neoprene boots are the best. Knee-length boots offer greater protection because they extend above the lower end of the apron. Avoid leather or fabric boots and shoes because these will absorb pesticides and cannot be cleaned effectively.	Wear your pant legs outside the top of your boots. This will prevent spills and splashes from running into the boot and onto your leg.

Protecting Your Eyes, Face and Lungs

Wear the following equipment to protect your facial area from exposure:

EQUIPMENT	PROTECTION	HOW TO WEAR IT
Goggles	Chemical-resistant goggles keep your eyes safe from both splashing and, if using dry formulations, dusts or granules. Don't use goggles with cloth or elastic headbands as these will absorb pesticides.	Wear goggles snugly on your face so that the sides of your head are protected from splashes. If you wear glasses, make sure you purchase goggles that fit snugly over them. Never wear contact lenses when working around pesticides.
Respirators	Only NIOSH-approved respirators should be used. Do not exchange parts of different respirators. (For example, do not use a cartridge produced by Company "A" with a respirator produced by Company "B" as the combination may not provide adequate protection to the user). Dust masks are ineffective in protecting against herbicide vapours. Similarly, the filters on tractor cabs are intended to remove dust and are not designed to protect against herbicide vapours or mists. Chemical cartridge respirators are recommended for outdoor use when mixing and applying herbicides.	When carrying out operations, change filters each day. The cartridge should be replaced when chemical odour becomes apparent or when breathing becomes difficult. New cartridges should always be installed at the beginning of the spray season. Prior to commencing work, check the face seal while the respirator is on the wearer's face. Regardless of design, respirators cannot be worn securely by people wearing beards, moustaches or sideburns.
Face Shields	Goggles offer some protection, but frequently full-face protection is advised or required according to the pesticide label. It is especially important to protect your eyes and face when pouring or mixing liquid concentrates. Effective face shields are made of clear plastic.	Since the shield attaches to the hard hat, you can raise or lower it as needed.

Avoiding Spray Drift:

To minimize the risk of drift, follow these guidelines:

1. Do not spray in winds above 15 km/h (9 mph).
2. Do not spray under dead calm conditions in early morning, night, or late evening. These are often associated with temperature inversions and the combination of these factors can result in long-distance spray drift (2 km or more). Fog or dust that seems to hang in the air is a good indicator of an inversion.
3. Avoid nozzle pressures above 45 psi (310 kPa) for conventional flat fan tips.
4. Use a minimum of 10 gal/acre (45 L/acre) water for all pesticides unless otherwise specified for the product.
5. Take note of buffer zones identified in the "Restrictions" section of this guide. Do not spray when the wind is blowing towards a nearby sensitive crop, shelterbelt, garden, or water body.
6. Use amine formulations of 2,4-D or MCPA where possible. Use special care when applying volatile herbicides (most herbicides in Group 3 and Group 4, particularly ester formulations). Avoid spraying these products on or immediately before hot days.
7. Ensure that air flow from air assisted sprayers is properly set to minimize airblast rebound and drift for different crop canopies.
8. Operate nozzles at their minimum recommended height. For 80º tips, this is 18" (45 cm), and for 110º tips, this is 12" (35 cm). Orienting nozzles forward allows further height reductions.
9. Special nozzles are now available that create coarse, low-drift sprays. Pre-orifice, Turbo-TeeJet, or venturi-type nozzles are available from a number of manufacturers, and these reduce drift by 50 to 95 percent. (Refer to the section entitled **Herbicide Efficacy with Low-Drift Nozzles**)
10. Consider equipping your sprayer with protective shrouds. A number of different designs are available that can reduce drift between 35 and 75 percent.

For more information on reducing drift refer the Factsheet entitled "Spray Drift – Causes and Solutions" available from your local extension office or at the SAF Website: www.agr.gov.sk.ca.

Herbicide Efficacy with Low-drift Nozzles

A number of low-drift nozzles are now available from different suppliers. Well established nozzles, such as the Turbo TeeJet, reduce drift by about 50 percent and provide equivalent efficacy to a standard flat fan nozzle. Newer nozzles ("venturi" types) are best known for their dramatic ability to reduce drift (50 to 95 percent), but information on pesticide efficacy is still scarce. Initial data suggest that these nozzles perform well at conventional carrier volumes, travel speeds, and product rates. Some aspects require special attention:

Pressure: Most venturi-type nozzles require higher pressures to operate properly. Below 40 psi (275 kPa), patterns may deteriorate rapidly resulting in poor overlaps and erratic control. Higher pressures are recommended (60 to 80 psi, or 415 to 550 kPa). Drift potential remains low, even at these high pressures. When using automatic rate controllers, make sure your pressures remain high enough for good nozzle performance.

Water Volume: Droplet size become more important at lower water volumes. Little is known about low-drift nozzle performance at or below 5 gal/acre (23 L/acre). Since low-drift nozzles generate fewer droplets than conventional nozzles, ensure that water volumes are high enough for coverage when using coarse sprays.

Weed Type: Difficult-to-wet weeds, such as wild oats, green foxtail, lamb's-quarters, and cleavers, typically require finer sprays for effective coverage. When using venturi nozzles on these weeds, make sure your pressure is high enough to achieve good coverage. Larger weeds and reduced product rates typically make chemical control more difficult, and these conditions may also reveal some performance differences between nozzles.

Herbicide Type: According to preliminary results, herbicides that belong to herbicide Groups 2, 4, and 9 perform well with venturi nozzles, even at normal pressures (40 psi). Application of herbicides in Groups 1, 6, 8, and 10 may require higher pressures with venturi nozzles to maintain good performance, especially under challenging conditions. Wild oat control may be reduced with the coarsest sprays, even when applied at high pressure.

Check with your chemical representative to see if the manufacturer supports the use of low-drift nozzles with their products.

More information is available in the factsheet "Making Sense of New Nozzle Choices," available from your local extension office or at the SAF Website: www.agr.gov.sk.ca.

Handling a Drift Complaint

When spray drift occurs, it is important to take the right steps to resolve the complaint. If you suspect that your crop or property has been damaged because of spray drift, use the following guidelines for resolving the situation.

1. Are you sure that the symptoms or damage you see has been caused by spray drift? Contact your local agricultural office to help determine if the damage is the result of spray drift.
2. Contact the suspected applicator as soon as possible. View the damage with the suspected applicator and determine if that person did, in fact, cause the damage.
3. If the damage was caused by the applicator, determine the extent of the damage and the level of compensation (if any) with the applicator.
4. If the situation cannot be resolved quickly because of disagreements on the extent of damage or level of compensation, contact your local agricultural office to discuss options on how to proceed. Documentation will be required, particularly if insurance companies are involved.
5. The involvement of a private consultant is recommended if documentation is required. Required documentation often includes samples of the damaged plants, photographs, and yield comparisons to determine losses. Your agricultural office can provide you with a list of private consultants in your area.
6. The best approach is to start an open and honest line of communication with the suspected applicator. The majority of drift complaints are resolved quickly and efficiently by communicating with the applicator, without the involvement of outside parties.

Mixing Pesticides

The ability to control a broad range of weeds or other pests in one pass is the advantage that a mix of two or more products allows. If tank mixing is not done in the correct order, the result could be a tank-load of material that may not control the target pests, cause injury to the crop, plug nozzles, or leave an undesirable residue in the tank that will require extensive cleaning. Mistakes like these are costly, could put the user at unnecessary risk of exposure to the products, or create an environmental disposal problem.

To avoid mixing that may result in incompatibilities, **always consult the label of the products that are being used** to learn the correct order. **Remember to add all like components at the same stage of mixing.** The list below is a general rule-of-thumb for mixing pesticides:

1. Fill the spray tank with 1/4 to 3/4 the amount of water required for the application and turn on the sprayer agitation. Check the products that are being used for the correct amount to add. Once agitation has begun, maintain until the tank is emptied.
2. Add any fertilizer or pH adjuster additives to the tank.
3. Add any wettable powders, water dispersible granules (DF, DG, or WDG), or flowable liquid suspensions to the tank. Add dry products slowly to prevent clogged return lines. Allow sprayer to agitate for a few minutes, allowing the product to become completely suspended

in the tank, before adding the next component.

4. Shake any containers of liquid pesticide thoroughly **before adding** to ensure they are well mixed.
5. Add any pesticides that are solutions (SN) (i.e. amines and salts)
6. Add emulsifiable concentrates (EC, SC) (i.e. esters)
7. Add any surfactants or other adjuvants.

Remember to always consult the label for compatible mixes and recommended mixing order.

Many pesticides will break down if left in the tank for an extended period. Try not to mix any more than you can spray at one time. If you need to stop spraying for a short time, leave the sprayer agitation running to keep products from settling or separating in the tank.

Container Disposal

Rinse all containers prior to disposal to reduce environmental contamination caused by open dumping of unwanted containers.

Triple Rinsing

Triple rinsing renders used pesticide containers (metal, plastic, glass) more than 99.9 percent free of residues, in most cases.

Here are the steps that should be followed:

1. Empty contents of the container into the spray tank and drain in a vertical position for 30 seconds.
2. Add a measured amount of rinse water or other diluent until container is about one-fifth full.
3. Rinse the container thoroughly and pour the rinsate into the spray tank.
4. Repeat the procedure twice (it should take only about 5 minutes in total).
5. Puncture or break triple rinsed containers to render them non-reusable. Paper bags should be rinsed once prior to disposal.

Pressure Rinsing

Also available are pressure rinsers that can rinse all sizes of empty pesticide containers that can be lifted into position over the spray tank.

A 30-second rinse with a pressure rinser is convenient and just as effective as triple rinsing.

Pressure rinsers are constructed to be thrust into the bottom of a metal can or plastic jug. Holes, situated laterally in the rinser tip, direct water from a pressurized source against the inner sides of the container and effectively wash the residual pesticide into the spray tank.

Some farmers have found it convenient to attach a rinser to the pump on their large water storage tank to minimize container handling.

Pressure rinsers have the added advantage of rendering containers useless by automatically puncturing them.

Disposal of Containers

Properly rinsed containers should be delivered to a designated pesticide container disposal site. Contact your ag rep, municipal office or weed supervisor for the locations of pesticide container disposal sites in your municipality.

How to Identify Crop and Weed Leaf Stages

Recognition of plant growth stages is essential for effective weed and disease control. Many herbicides and fungicides are safe on a crop only when applied at a specific growth stage. Similarly, weeds are controlled only when they are at certain growth stages.

For most post-emergent products, growth stages are described by the number of leaves. The following is a description of how to count leaves for staging.

Cereals and Annual Grass Weeds

Manufacturers generally use two different systems of staging for grasses. The minimum stages of application are similar, while the later stages may differ.

Some manufacturers use "Total Leaf Count" stages based on the number of leaves on the entire plant, including tillers or secondary shoots. Most recommendations however, are based on the number of main stem leaves and tillers. Tillers or stools are the secondary shoots or stems of a grass plant. Similar to the branches of a broadleaf plant, tillers will emerge from the axils between the leaf and main shoot. Tillers usually begin to appear at the 3 or 4 leaf stage. When staging a plant in this manner, be sure to identify the tillers first, then count only leaves that originate from the main shoot.

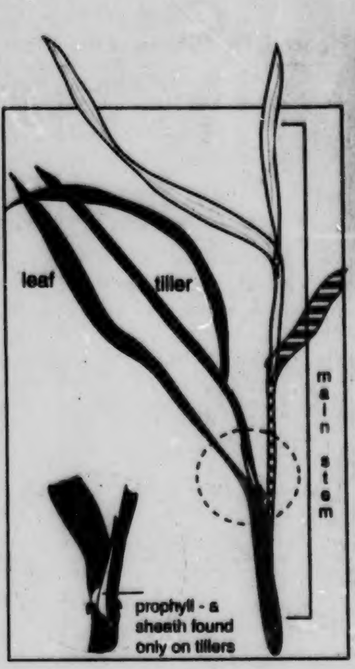

leaf
tiller
main stem
prophyll - a sheath found only on tillers

Figure 2. Leaf Stages of Cereals and Annual Grass Weeds

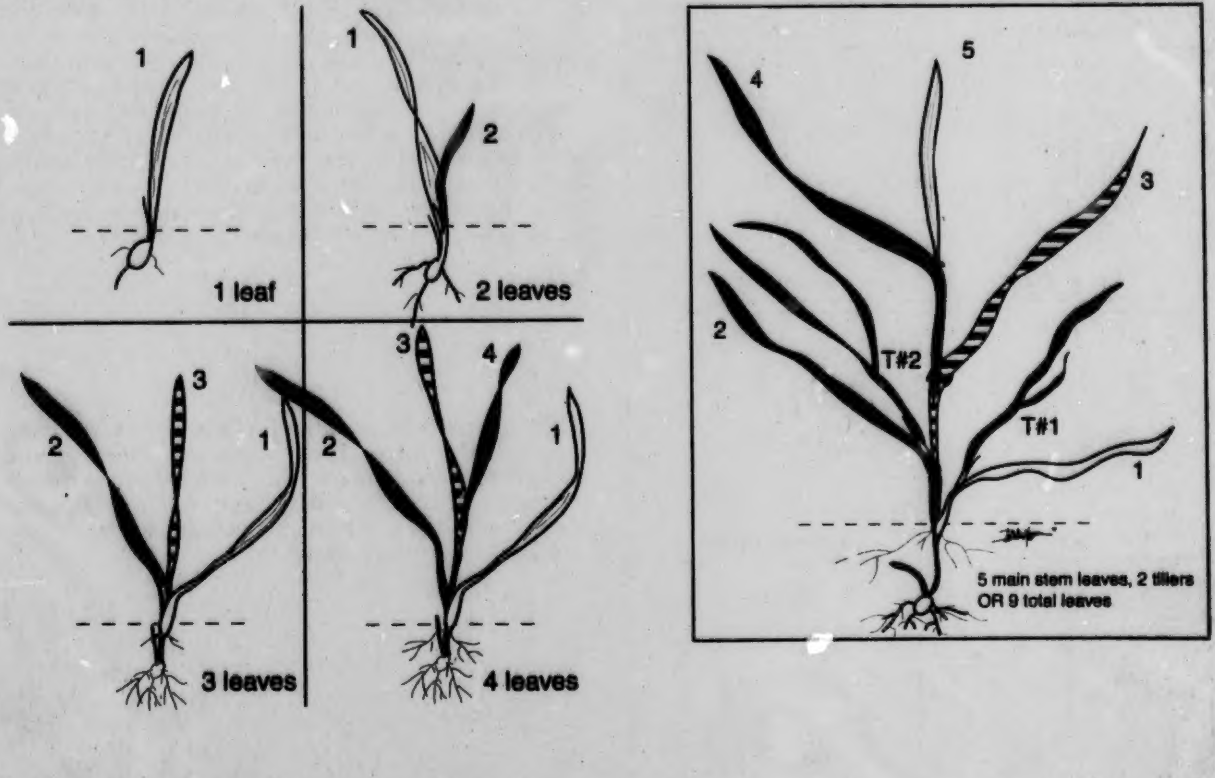
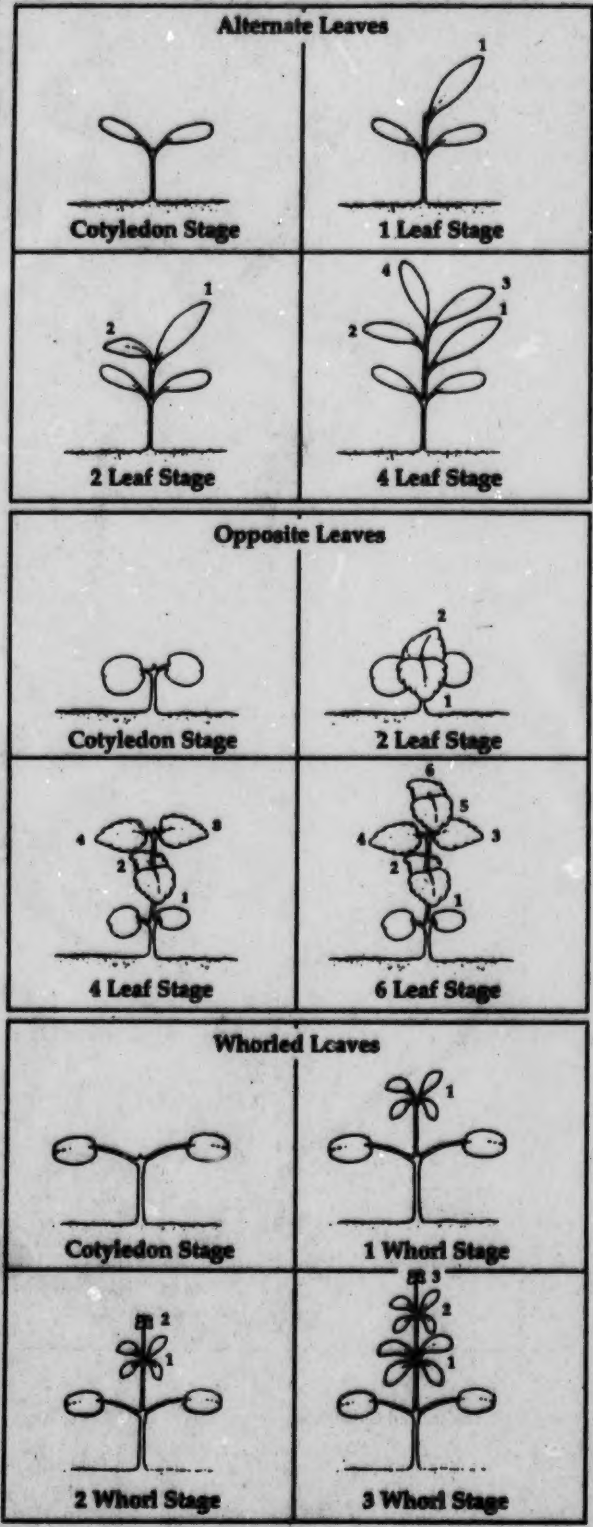

1
1 leaf
1
2
2 leaves
2
3
1
3 leaves
3
4
2
1
4 leaves
4
5
3
2
T#2
T#1
1
5 main stem leaves, 2 tillers
OR 9 total leaves

Figure 3. Leaf Stages of Broadleaf Weeds and Crops


Alternate Leaves
1
Cotyledon Stage
1 Leaf Stage
1
2
4
3
1
2
2 Leaf Stage
4 Leaf Stage
Opposite Leaves
2
1
Cotyledon Stage
2 Leaf Stage
6
4
3
2
1
5
4
3
2
1
4 Leaf Stage
6 Leaf Stage
Whorled Leaves
1
Cotyledon Stage
1 Whorl Stage
2
1
3
2
1
2 Whorl Stage
3 Whorl Stage

Broadleaf Weeds

Cotyledons - These are the seed leaves that usually emerge above ground. On some plants, such as fababeans, lentils and peas, they stay below the soil surface. Cotyledons are not true leaves and are not counted when determining leaf number. They are a different shape than the true leaves and may dry up and disappear at an early stage.

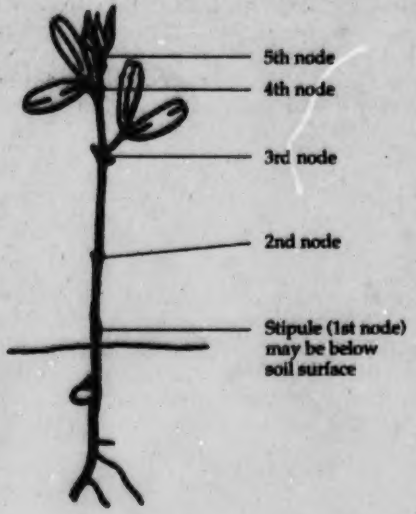
Alternate leaves - Some plants have one leaf at each node on the stem. The next leaf emerges at the next higher node and extends away from the stem in the opposite direction. These plants (lamb's quarters and wild mustard are good examples) are said to have alternate leaves. To determine the leaf stage, simply count the number of leaves present (Figure 3).

Opposite leaves - Plants with two leaves at each node, one on each side of the stem, are said to have opposite leaves. The next pair of leaves on the next node are rotated about 45° so that they are not directly over the previous pair. Plants with opposite leaves have even-leaf numbers only. When counting, the leaf number progresses from cotyledons to 2 leaf, 4 leaf, etc. These plants generally appear shorter than plants with alternate leaves at a similar leaf stage. **Be sure to count each pair as two leaves.** Hemp nettle is a weed that has opposite leaves (Figure 3).

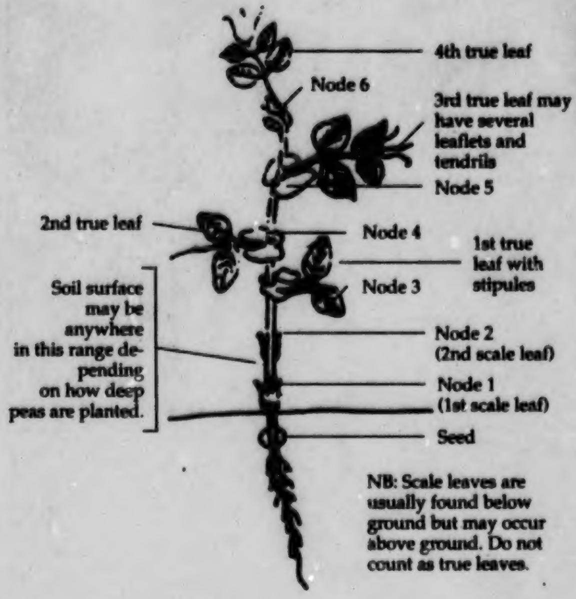
Whorled leaves - More complex plants like cleavers may have whorled leaves. These plants have three or more leaves at each node on the stem. The leaf number in each whorl may vary, so be sure to count each individual leaf unless the Guide or label recommendation refers to the number of leaf whorls (Figure 3).

Figure 4. Leaf Stages of Certain Special Crops and Forages

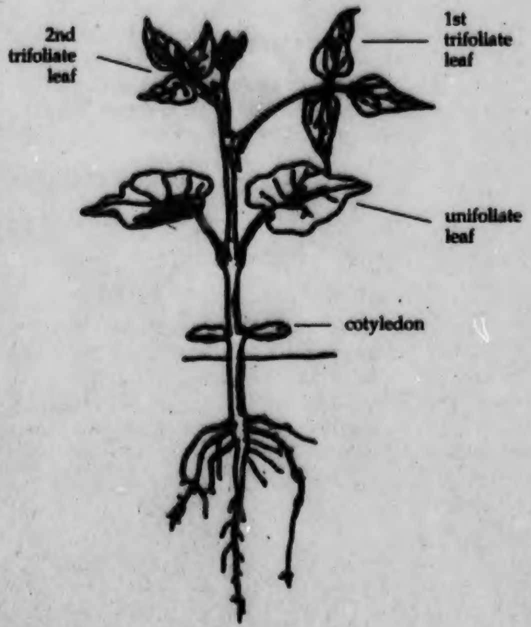
Lentil Seedling


5th node
4th node
3rd node
2nd node
Stipule (1st node) may be below soil surface

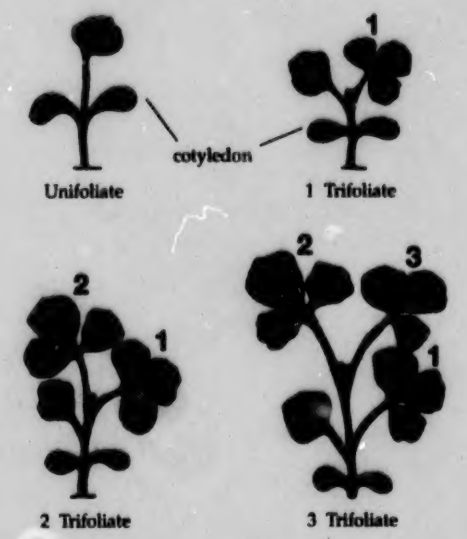
Field Pea Seedling


4th true leaf
Node 6
3rd true leaf may have several leaflets and tendrils
Node 5
2nd true leaf
Node 4
1st true leaf with stipules
Node 3
Soil surface may be anywhere in this range depending on how deep peas are planted.
Node 2 (2nd scale leaf)
Node 1 (1st scale leaf)
Seed
NB: Scale leaves are usually found below ground but may occur above ground. Do not count as true leaves.

Dry Bean Seedling


2nd trifoliate leaf
1st trifoliate leaf
unifoliate leaf
cotyledon

Forage Legume Seedling


1
cotyledon
Unifoliate
1 Trifoliate
2
1
2 Trifoliate
2
3
1
3 Trifoliate

Stages of Alfalfa, Red Clover and Alsike Clover Leaf Development

Weed Control

Resistance of Weeds to Herbicides

In recent years, the number of herbicide-resistant weeds and the areas they infest have increased.

Most herbicide-resistant weed infestations have developed following repeated use of the same herbicide (or herbicide group) for a number of years on the same field. Growers who have developed weed resistance on their farms will typically see a weed, which is normally controlled by a herbicide, escape uncontrolled after a number of years of use of the same product or product group. Individual plants may be resistant to 1.5 up to 10 or more times the normal field rate.

How to Identify Weed Resistance

It is important to avoid confusing herbicide failure caused by resistance with herbicide failure caused by various other factors (such as weather or application errors). When a herbicide fails to control weeds because of weather or application factors, that herbicide may work in the field the next season. But when herbicides fail because of the development of resistance, they will fail in subsequent years, regardless of weather or application procedures.

Herbicide resistance should be suspected under the following conditions:

- A weed species that the herbicide controlled in previous seasons now escapes the treatment, while other weeds that appear on the label continue to be controlled in the field.
- The escapes cannot be attributed to adverse weather or emergence after application (if a post-emergence product is in question).
- Irregular-shaped patches of a weed develop where the herbicide gives little or no control.
- Records of the past history of the field show repeated use of the same herbicide, or combinations of herbicides, that kill the weed in question in the same way.

Table 1: Herbicide-Resistant Weeds in Manitoba and Saskatchewan

WEED	DESCRIPTION OF RESISTANCE
Wild oats	Resistant to Group 1 herbicides (see Table 2, p. 20).
Wild oats	Resistant to Group 2 herbicides (see Table 2, p. 20)
Wild oats	Resistant to Group 8 herbicides (see Table 2, p. 20).
Wild oats	Resistant to Group 1, 2 and 8 (see Table 2, p. 20). At present, confirmed in Manitoba.
Green foxtail	Resistant to Group 3 herbicides (see Table 2, p. 20).
Green foxtail	Resistant to Group 1 herbicides (see Table 2, p. 20).
Green foxtail	Resistant to herbicides in both Groups 1 and 3 (see Table 2, p. 20).
Wild mustard	Resistant to Group 4 herbicides (see Table 2, p. 20). At present, confirmed in Manitoba.
Wild mustard	Resistant to Group 5 herbicides (see Table 2, p. 20). At present, confirmed in Manitoba .
Kochia, wild mustard, chickweed, hemp-nettle, Russian thistle	Resistant to Group 2 herbicides (see Table 2, p. 20). Wild mustard, chickweed and hemp-nettle confirmed in Manitoba. Russian thistle confirmed in Saskatchewan.

Avoiding Weed Resistance

It is far easier to avoid development of resistant weed strains than it is to eradicate or control them after they develop and infest an area.

To avoid the development of resistance on your farm, take the following steps:

1. Rotate herbicide usage so that the same herbicide is not used year after year. Rather than using the same product on an annual basis, consider using other products on a regular basis.
2. Be aware that when resistance to one product develops in a weed population, it can often mean the weed population has developed resistance to other herbicides that act in a similar manner.

   For example, green foxtail, which is resistant to Trifluralin, may be resistant to Edge as well; kochia, which is resistant to Ally, may be resistant to Refine Extra; wild oat populations resistant to Hoe-Grass 284 may be resistant to Achieve, Assure/Assure II, Poast Ultra, Puma or Select.

   This means that your long-term herbicide planning should ensure against using products from within the same group of herbicides year after year.
3. Keep accurate records of crop rotation and herbicide use. It will be easier to plan your long-term weed man-

agement strategies if you have good records of your past management practices.

4. Limit the use of herbicides that remain active in the soil for extended periods of time. Examples are Ally and Amber. This is particularly important if these products have been used within the past 4 years.

Resistance Grouping

To help you plan your herbicide program, the following table lists "herbicide groups." To slow down the process of developing weed resistance, use products from different groups from year to year on your fields.

Table 2: Herbicide Groups Based on Mode of Action

Group 1 (contain ACCase grasskillers)	Achieve, Assure II, Champion Extra*, Champion Plus*, FlaxMax Ultra*, Freedom Gold*, Fusion, Harmony Total*, Hoe-Grass 284, Hoe-Grass II*, Horizon, Horizon BTM*, Laser DF*, Muster Gold*, Poast Ultra, Prevail*, Puma Super, Pursuit Ultra*, Select, Triumph Plus*, Venture
Group 2 (contain ALS/AHAS inhibitors)	Accent, Ally, Anthem*, Assert, Champion Extra*, Champion Plus*, Escort, Express Pack*, Everest, Freedom Gold*, Harmony Total*, Laser DF*, Muster, Muster Gold*, Odyssey, Pinnacle, Prism, Pursuit, Pursuit Ultra, Refine Extra, Sundance, Triumph Plus*, Unity*
Group 3 (contain mitotic inhibitors)	Advance, Bonanza, Edge, Fortress*, Heritage, Rival, Treflan
Group 4 (contain growth regulator herbicides)	2,4-D, MCPA, Accord, Anthem*, Attain, Banvel II, Breaker*, Buctril M*, Champion Plus*, Clovitox Plus, Compitox, Curtail M, DyVel, DyVel DS, Eclipse*, Embutox, Estaprop, Express Pack*, FlaxMax Ultra*, Laser DF*, Lontrel, Mecoprop, Pea Pack*, Prestige, Prevail*, Rustler*, Sword, Target, Thumper*, Tropotox Plus, Triumph Plus*
Group 5 (contain photosynthetic inhibitors – triazines)	Atrazine, Bladex, Breaker*, Laddock*, Lexone, Pea Pack*, Primextra II Magnum*, Princep Nine-T, Sencor, Simazine, Velpar
Group 6 (contain photosynthetic inhibitors – nitriles/benzothiadiazoles)	Basagran, Buctril M*, Compas, Hoe-Grass II*, Horizon BTM*, Laddock*, Pardner, Thumper*, Unity*
Group 7 (contain photosynthetic inhibitors – ureas/amides)	Afolan F, Linuron, Lorox, Stampede EDF
Group 8 (unknown mode of action)	Avadex BW, Avenge, Eptam 8E, Eradicane 8E, Fortress*
Group 9 (contain inhibitors of EPSP synthase)	Credit, Eclipse*, Glyfos, Maverick, Renegade, Roundup Dry, Roundup Fast Forward*, Roundup Original, Roundup Renew, Roundup Transorb, Rustler*, Touchdown, Vantage, Vantage Plus, Victor
Group 10 (contain inhibitors of glutamine synthetase)	Liberty, Roundup Fast Forward*
Group 11 (inhibit carotenoid synthesis - triazoles)	Amitrol 240
Group 15 (inhibit cell division - benzamides, chloroacetamides)	Dual II Magnum, Frontier, Kerb, Primextra II Magnum
Group 22 (membrane rupture, photosynthetic inhibitors)	Gramoxone, Reglone

*Some products contain more than one active ingredient and therefore may appear in more than one group. In some instances, both active ingredients act to kill the same weed using different modes of action. In these instances, use of tank mixes may slow down the process of developing weed resistance.

New herbicides do not necessarily have a unique mode of action and may fall within the groups listed in the charts.

Herbicides that have the same mode of action may not control the same weed spectrum or have the same crop safety. For example, Assert and Ally have the same mode of action; however, Assert controls wild oats while Ally does not.

If Weed Resistance Develops on Your Farm

It is important to identify weed resistance before it spreads across your farm. Plan on conducting a "patch watch" scouting program this summer to identify suspicious patches before they become difficult to manage. Resistant weed patches have been identified on fields where producers were unaware of their existence.

Your patch watch program should begin shortly after spraying and continue through July after the crop has headed out and most weeds are visible from a distance. If you find suspicious looking patches, contact your local agricultural office or crop protection company representative to assist you in confirming weed resistance. If resistance is suspected:

1. Map the location of the patches and mark them with stakes so you will remember their location.
2. Mow, cultivate or spot spray the patches. Resistant patches should not be allowed to produce seed.
3. Patchy areas should NOT be harvested with the rest of the field. Harvest these areas separately, and make sure to clean all harvesting equipment before leaving the area to prevent the spread of seeds across the field or to a neighbouring field.

4. Check patches each year to monitor their spread. Keeping your resistant weeds isolated to a manageable patch is easier than dealing with an entire field of resistant weeds.

Integrated Weed Management

A recent survey of wild oats in Manitoba showed that a number of patches were resistant to herbicides that they had never been treated with before. This survey has highlighted that fact that rotating herbicides is only a first aid measure to delay herbicide resistance. Long term management involves integrated approaches to weed control.

Practising integrated weed management means enhancing your chemical weed control program with cultural techniques. It does not mean abandoning chemical weed control, just relying on it less. For example:

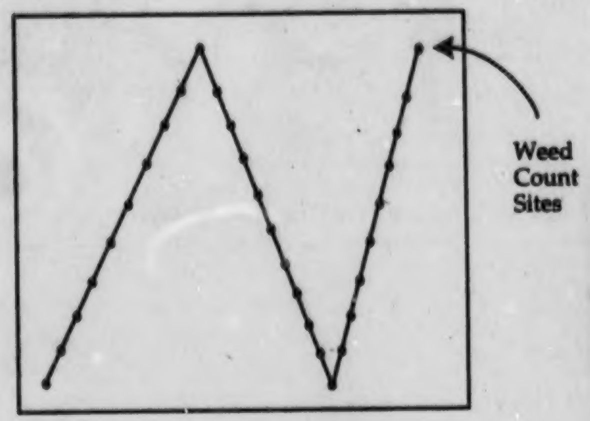
- You may decide to choose a normal-height wheat or a tall, viny pea variety for a certain field. These crop selections will compete strongly with weeds, possibly allowing you to skip a spray operation.
- You could insert a short-term forage crop into your crop rotation. Studies show that short-term alfalfa stands can reduce wild oat and green foxtail populations by up to 80 percent the year after breaking.
- Early sown barley may give you enough of a "jump" on the weeds that you can avoid herbicide applications.
- Use of vigorous, high-quality seed, sown shallow, can give you better crop competition than poor-quality or deeply sown crop seed.
- Banding nitrogen near the seed can give your crop an advantage over weeds.

Making Spray Decisions

Field Scouting

Field scouting is an important tool for making informed spray decisions. Accurately assessing the type and number of weeds in the field will help you determine if a spray operation is necessary. The scouting pattern diagram on this page provides a guideline for scouting a field. The entire field should be walked to get a feel for the distribution of the weeds present. A minimum of 20 weed counts should be taken across the field. A smaller number may be used, but be aware that accuracy decreases as the number of counts gets smaller. Count the number of weeds in a 1 m^2 or a 0.25 m^2 area and divide the total number of weeds by the number of counts taken to obtain an average for the field. If using 0.25 m^2 samples, make sure to multiply by 4 so your average is for a 1 m^2 area.

Some weeds are not distributed uniformly and may be found in patches (for example, Canada thistle) or in low spots. As well, the type and number of weeds found along the field edges may be very different from those found inside the field. These areas should be considered separate from the rest of the field. If possible, patches, low spots, and field borders should be treated separately, as field wide spraying may not be required. Look out for new invading weeds and patches of herbicide-resistant weeds. Herbicide-resistant weeds and new invaders should be controlled, regardless of their number, to prevent them from spreading and becoming a serious control problem. Mapping your field's weed problems will allow you to monitor the spread of weed patches over time and help you assess the effectiveness of your control program.



Yield Losses Caused by Weeds

Knowing the amount of crop yield loss caused by a given weed density will help you decide if a spray operation is required. The tables on the following pages give an indication of the yield loss caused by some of the important grassy weeds of Manitoba.

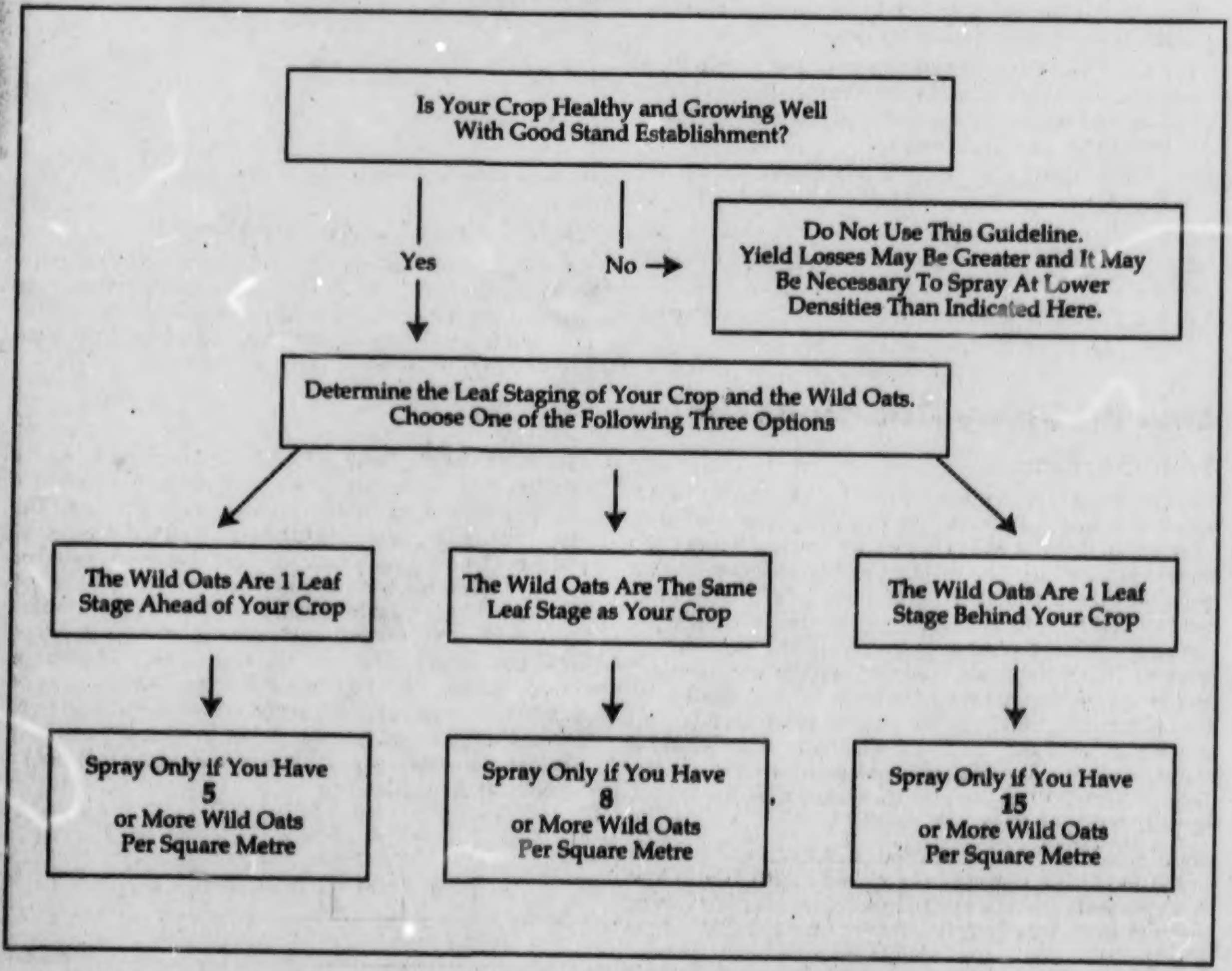
THESE TABLES SHOULD BE USED ONLY AS A GUIDE. The figures are based on western Canadian research trials and will not be accurate all of the time. The yield loss values apply only to healthy, well fertilized crops with good stand establishment. Crops that are diseased or emerged unevenly will not compete well with weeds and will suffer larger yield losses than indicated in these tables. The yield loss figures are based on competition from single weed species only. Other weeds, such as wild mustard or Canada thistle, must be controlled if the figures are to be accurate. As well, the tables are based on competition from normal height crops. Semi-dwarf or hybrid varieties may not compete as well with weeds and the figures may not be accurate in these cases.

Table 1. Yield Losses (Percent) in Wheat Caused by Wild Oats.

	Wild Oat Density – Number Per Square Metre																
	1	2	4	6	8	10	12	14	16	18	20	25	30	35	40	45	50
Wild Oats are 1 Leaf Stage Ahead of the Crop	1	2	4	6	8	10	12	14	15	17	19	22	26	29	32	34	37
Wild Oats are the Same Leaf Stage as the Crop	1	1	2	4	5	6	7	8	9	10	11	14	16	18	20	22	24
Wild Oats are 1 Leaf Stage Behind the Crop	0	1	1	2	3	3	4	5	5	6	7	8	10	11	13	14	15

Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Figure 1. Spray Decision Guideline for Wild Oats in Wheat.



Is Your Crop Healthy and Growing Well With Good Stand Establishment?

Do Not Use This Guideline. Yield Losses May Be Greater and It May Be Necessary To Spray At Lower Densities Than Indicated Here.

Determine the Leaf Staging of Your Crop and the Wild Oats. Choose One of the Following Three Options

The Wild Oats Are 1 Leaf Stage Ahead of Your Crop

The Wild Oats Are The Same Leaf Stage as Your Crop

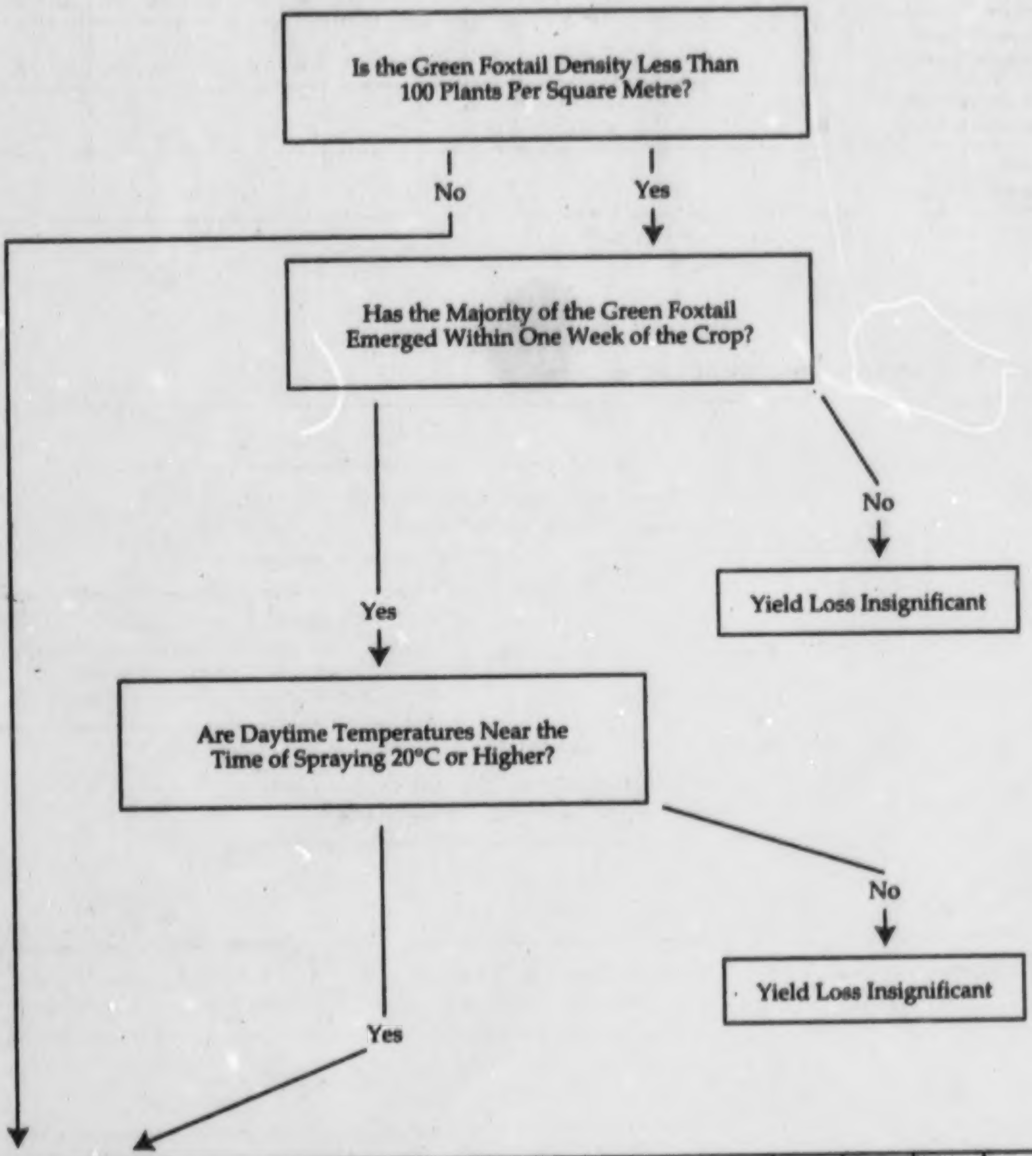
The Wild Oats Are 1 Leaf Stage Behind Your Crop

Spray Only if You Have 5 or More Wild Oats Per Square Metre

Spray Only if You Have 8 or More Wild Oats Per Square Metre

Spray Only if You Have 15 or More Wild Oats Per Square Metre

Table 2. Yield Losses (Percent) in Wheat Caused by Green Foxtail (Wild Millet).


Is the Green Foxtail Density Less Than 100 Plants Per Square Metre?
No
Yes
Has the Majority of the Green Foxtail Emerged Within One Week of the Crop?
No
Yield Loss Insignificant
Yes
Are Daytime Temperatures Near the Time of Spraying 20°C or Higher?
No
Yield Loss Insignificant
Yes

Green Foxtail Density (no. per square metre)	50	75	100	125	150	175	200	250	300	350	400	450	500
Yield Loss (percent)	2	3	5	6	7	8	9	11	14	16	18	20	23

Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Table 3. Yield Losses (Percent) in Barley Caused by Wild Oats.

	Wild Oat Density – Number Per Square Metre																		
	1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	100
Wild Oats are 1 Leaf Stage Ahead of the Crop	1	5	10	14	17	20	22	24	26	28	29	31	32	33	34	35	36	37	39
Wild Oats are the Same Leaf Stage as the Crop	0	2	4	6	8	9	11	12	13	15	16	17	18	19	20	21	22	22	25
Wild Oats are 1 Leaf Stage Behind the Crop	0	1	2	2	3	4	4	5	6	6	7	8	8	9	9	10	10	11	12

Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)
Note: Lodging becomes a concern in barley when wild oat densities exceed approximately 20 plants per square metre.

Figure 2. Spray Decision Guideline for Wild Oats in Barley.

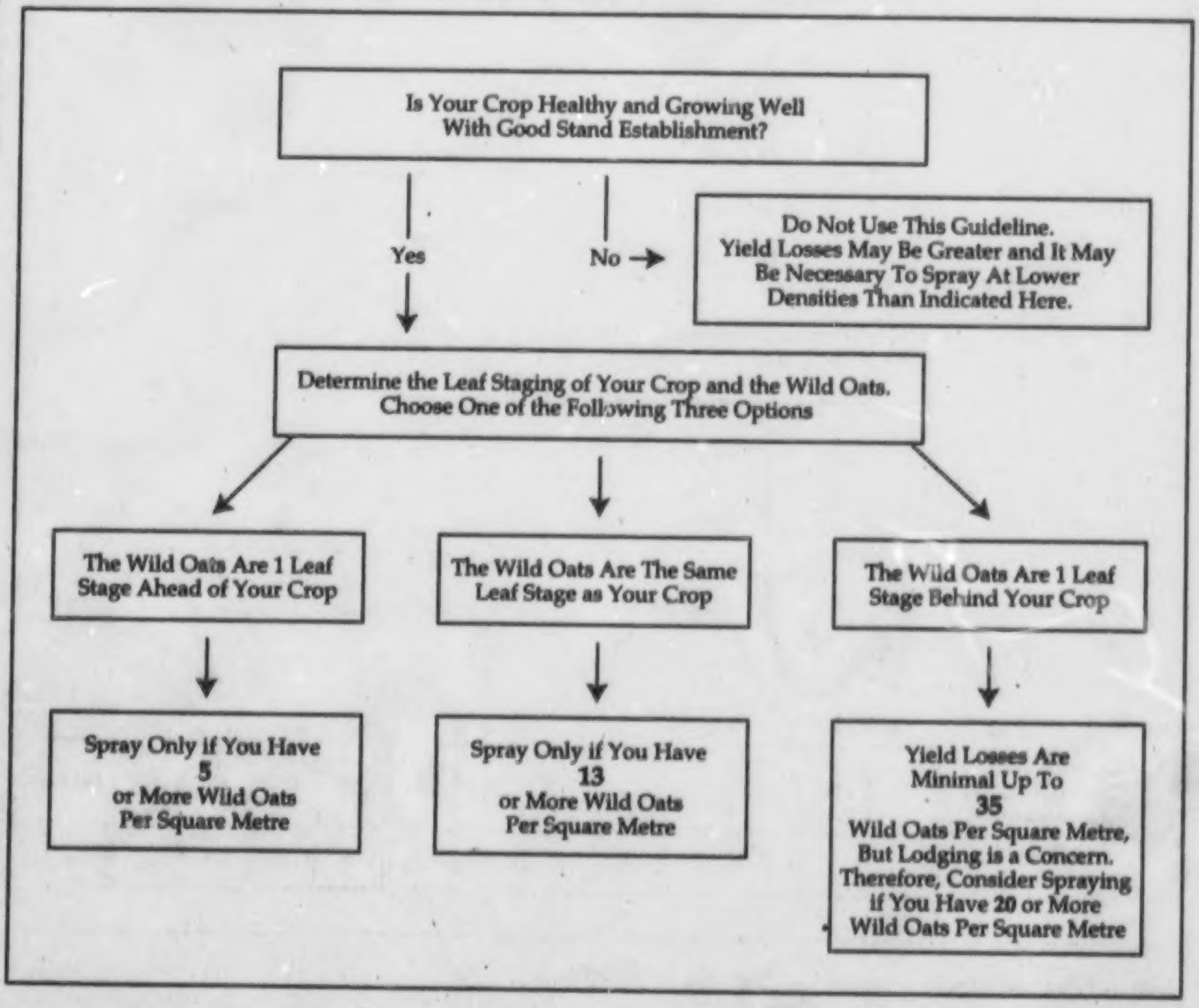
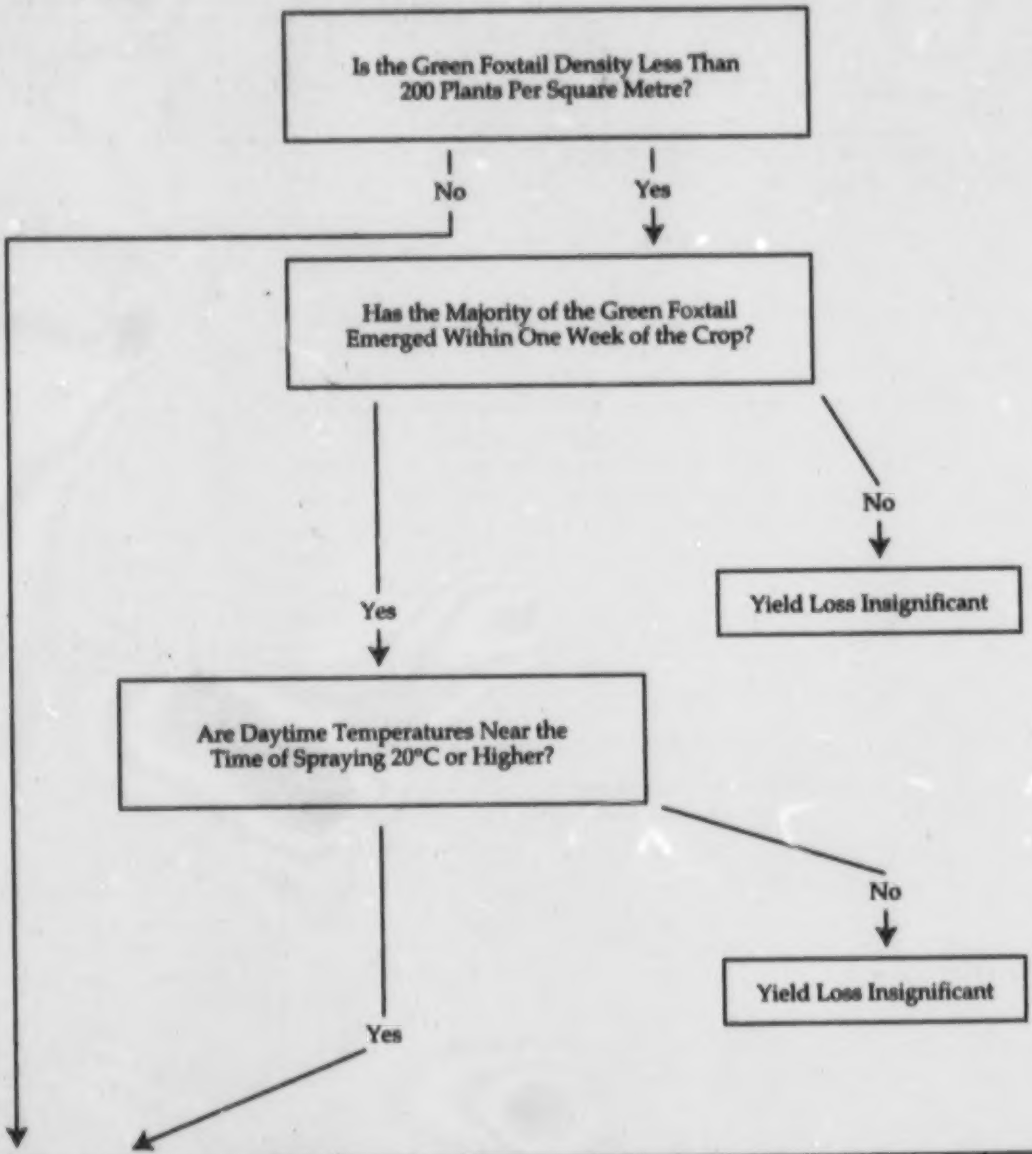

Is Your Crop Healthy and Growing Well With Good Stand Establishment?
Yes
No
Do Not Use This Guideline. Yield Losses May Be Greater and It May Be Necessary To Spray At Lower Densities Than Indicated Here.
Determine the Leaf Staging of Your Crop and the Wild Oats. Choose One of the Following Three Options
The Wild Oats Are 1 Leaf Stage Ahead of Your Crop
The Wild Oats Are The Same Leaf Stage as Your Crop
The Wild Oats Are 1 Leaf Stage Behind Your Crop
Spray Only if You Have 5 or More Wild Oats Per Square Metre
Spray Only if You Have 13 or More Wild Oats Per Square Metre
Yield Losses Are Minimal Up To 35 Wild Oats Per Square Metre, But Lodging is a Concern. Therefore, Consider Spraying if You Have 20 or More Wild Oats Per Square Metre

Table 4. Yield Losses (Percent) in Barley Caused by Green Foxtail (Wild Millet).


Is the Green Foxtail Density Less Than 200 Plants Per Square Metre?
No
Yes
Has the Majority of the Green Foxtail Emerged Within One Week of the Crop?
No
Yield Loss Insignificant
Yes
Are Daytime Temperatures Near the Time of Spraying 20°C or Higher?
No
Yield Loss Insignificant
Yes

Green Foxtail Density (no. per square metre)	50	75	100	125	150	175	200	250	300	350	400	450	500
Yield Loss (percent)	1	2	3	3	4	5	6	7	8	10	11	13	14

Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Table 5. Yield Losses (Percent) in Canola Caused by Wild Oats and Volunteer Cereals.

	Weed Density – Number Per Square Metre												
	1	2	4	6	8	10	12	14	16	18	20	25	30
Wild Oats	3	5	6	8	9	10	11	12	13	14	15	16	18
Volunteer Wheat	1	3	6	8	10	11	12	14	15	16	17	19	21
Volunteer Barley	3	5	8	10	12	14	15	17	18	19	20	23	25

Sources: Dew and Keys, Agriculture Canada (Lacombe, Alberta)
O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Figure 3. Spray Decision Guideline for Wild Oats and Volunteer Cereals in Canola.

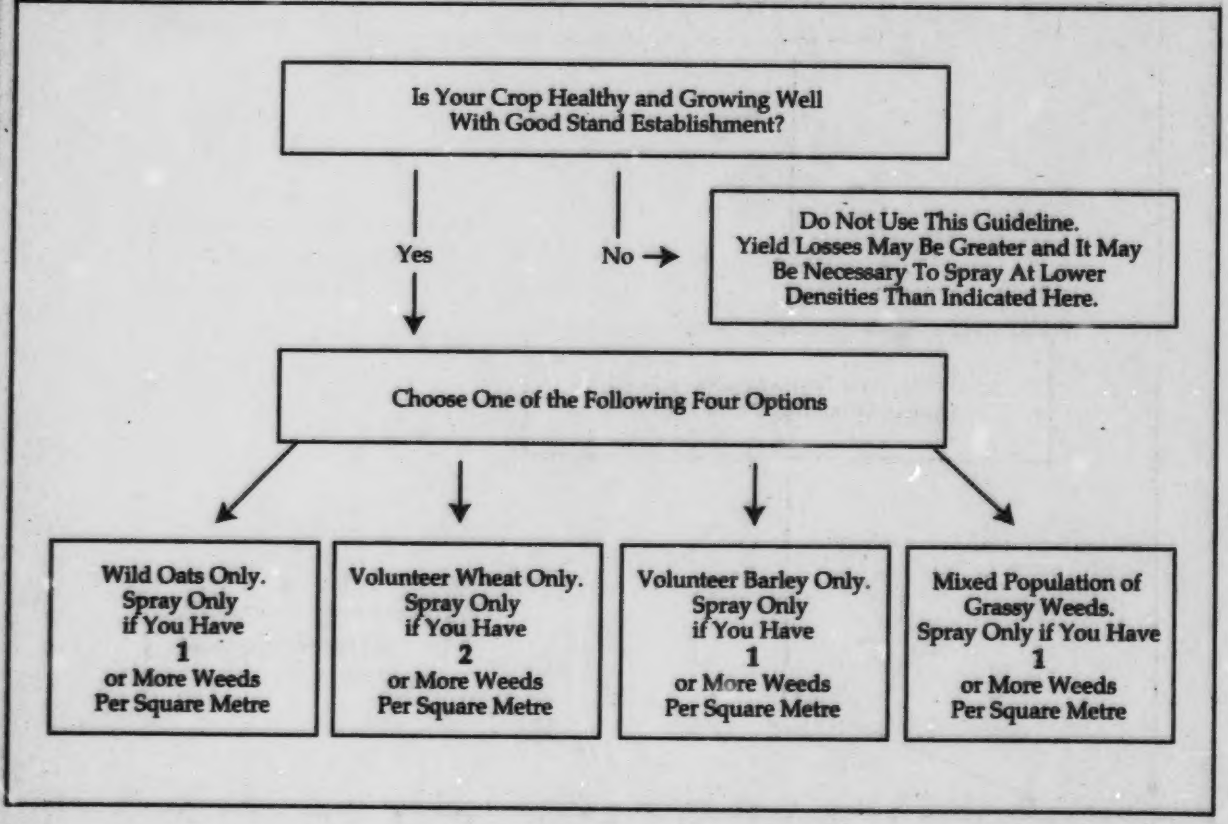
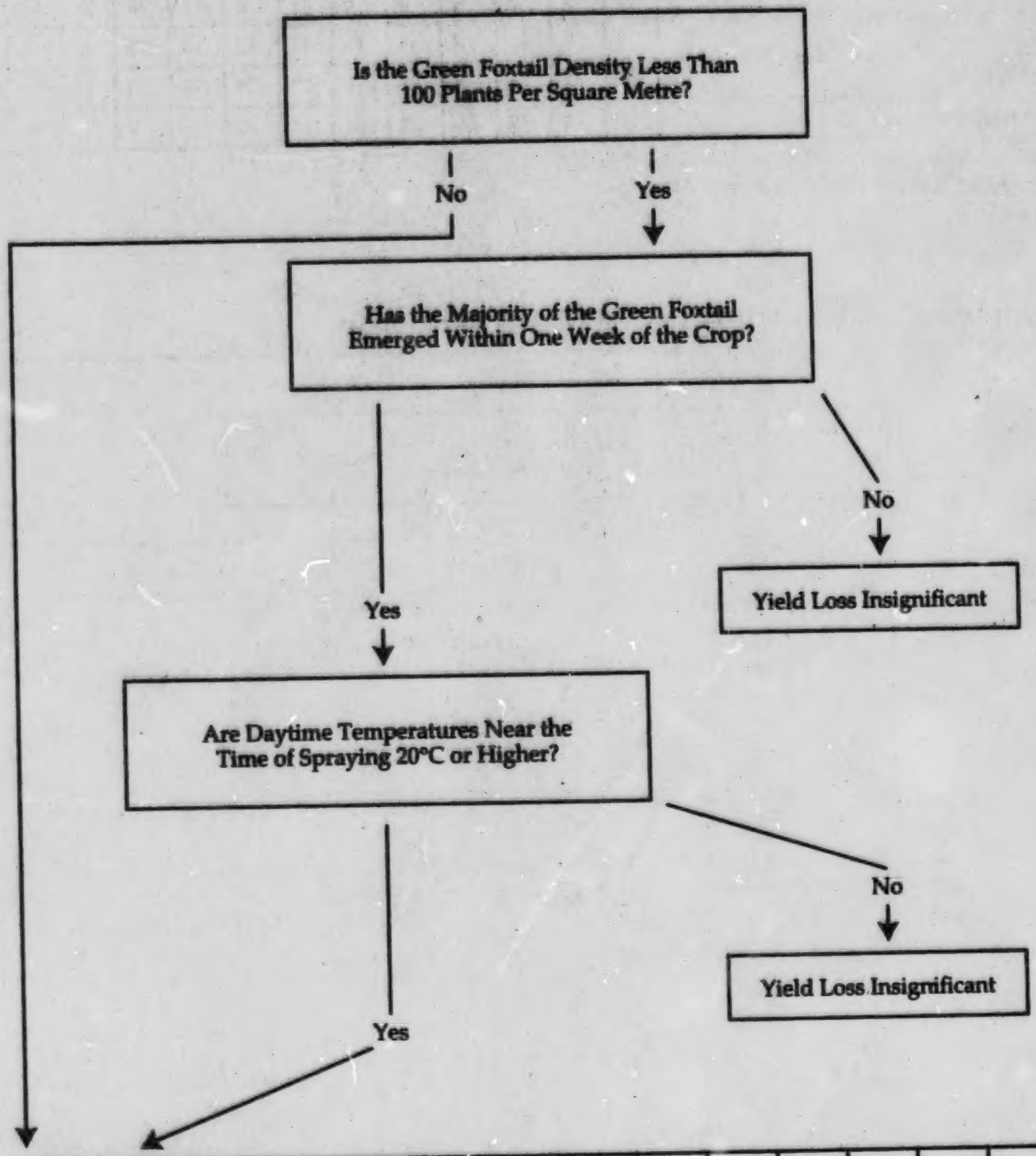

Is Your Crop Healthy and Growing Well
With Good Stand Establishment?
Yes
No
Do Not Use This Guideline.
Yield Losses May Be Greater and It May
Be Necessary To Spray At Lower
Densities Than Indicated Here.
Choose One of the Following Four Options
Wild Oats Only.
Spray Only
if You Have
1
or More Weeds
Per Square Metre
Volunteer Wheat Only.
Spray Only
if You Have
2
or More Weeds
Per Square Metre
Volunteer Barley Only.
Spray Only
if You Have
1
or More Weeds
Per Square Metre
Mixed Population of
Grassy Weeds.
Spray Only if You Have
1
or More Weeds
Per Square Metre

Table 6. Yield Losses (Percent) in Canola Caused by Green Foxtail (Wild Millet)


Is the Green Foxtail Density Less Than 100 Plants Per Square Metre?
No
Yes
Has the Majority of the Green Foxtail Emerged Within One Week of the Crop?
No
Yield Loss Insignificant
Yes
Are Daytime Temperatures Near the Time of Spraying 20°C or Higher?
No
Yield Loss Insignificant
Yes

Green Foxtail Density (no. per square metre)	50	75	100	125	150	175	200	250	300	350	400	450	500
Yield Loss (percent)	3	4	5	6	8	9	10	13	15	18	20	23	25

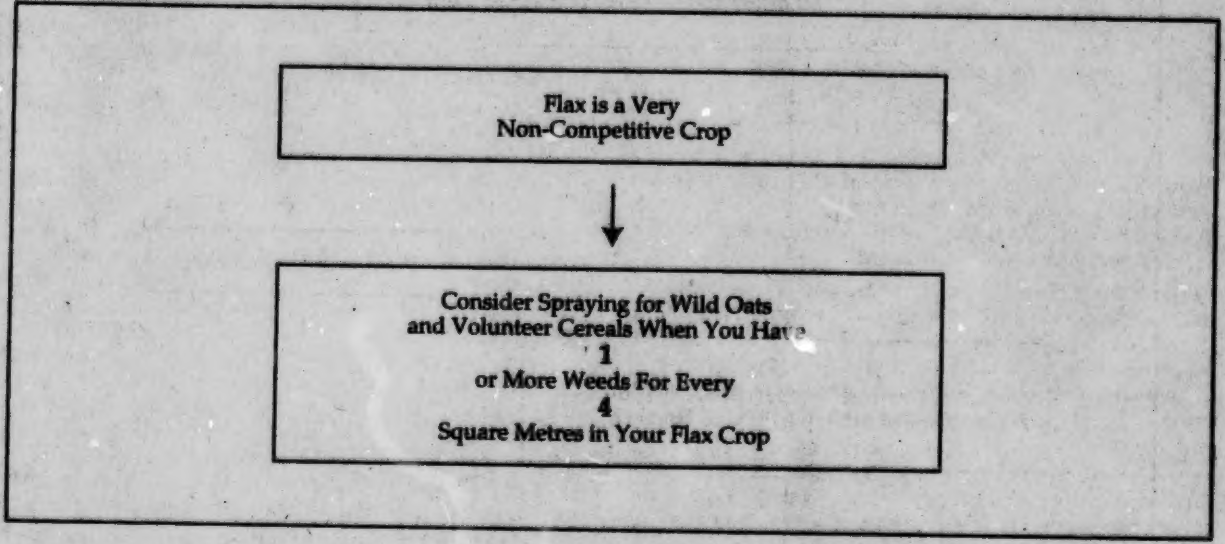
Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Table 7. Yield Losses (Percent) in Flax Caused by Wild Oats and Volunteer Cereals.

	Weed Density – Number Per Square Metre									
	1	2	3	4	5	6	7	8	9	10
Wild Oat	6	8	10	12	13	15	16	17	18	19
Volunteer Wheat	6	11	15	18	22	24	27	29	31	33
Volunteer Barley	6	12	16	21	24	28	31	34	36	39

Sources: Dew and Keys, Agriculture Canada (Lacombe, Alberta)
Friesen et al., University of Manitoba (Winnipeg, Manitoba)

Figure 4. Spray Decision Guideline for Wild Oats and Volunteer Cereals in Flax.



Flax is a Very
Non-Competitive Crop

Consider Spraying for Wild Oats
and Volunteer Cereals When You Have
1
or More Weeds For Every
4
Square Metres in Your Flax Crop

Deciding to Spray – Economic Thresholds and Herbicide Resistance

An economic threshold is the level of infestation at which lost yield exceeds the cost of the chemical and its application. Determining the economic threshold will help you decide if a spray operation is necessary.

The following example outlines how to determine an economic threshold:

You have a wild oat problem in your wheat. After a thorough field scouting you have determined that your field has an average density of 35 wild oats per square metre. You know that the crop and weeds are at the same leaf stage. Using Table 1, choose the "Same Leaf Stage" row and read across to 35 wild oats per square metre. You will find that your yield loss will be about 18 percent.

You think it could be a 40 bushel per acre wheat crop, and expect to get $3 per bushel for it. Therefore:

40 bushels x 0.18 (percent of expected yield loss) =
7.2 bushels per acre of lost yield

7.2 bushels x $3 per bushel =
$21.60 per acre of lost income

Now find out the price of your herbicide. Most wild oat herbicides for wheat cost about $15 per acre. In this case, lost income exceeds the cost of the herbicide and application, so spraying would be justified.

Alternatively, you may want to use the figures provided with some of the yield loss tables. These figures provide flowcharts to assist you in making spray decisions. In some cases the flowcharts may indicate to spray when you do not have an economic threshold weed density, but most times they will prevent you from spraying unnecessarily.

Another factor to consider when deciding whether to spray is your herbicide rotation. A one in three rotation of herbicide groups is currently recommended to delay the development of herbicide resistance for weeds such as wild oats and green foxtail. Skipping a spray operation will give you an extra year of flexibility in your herbicide rotation. This means that you have one extra herbicide group to choose from the year after you skipped the spray operation. When making spray decisions, the ability to rotate herbicides should be considered in addition to the economics of spraying.

Making the Spray Decision

Remember that economic thresholds should be used only as guides when making a spray decision. Lost income caused by dockage or downgrading must also be considered. **FIELDS THAT ARE NOT SPRAYED THIS YEAR HAVE A HIGHER POTENTIAL FOR PROBLEMS THE FOLLOWING YEAR BECAUSE OF WEED SEED RETURN.** A farmer's experience and common sense play an important role when deciding to spray. Used properly, however, the economic threshold can be an important tool in making spray decisions.

Adjuvants and Your Herbicide

Adjuvants are important ingredients in chemical weed control. Many herbicides must be applied with an adjuvant. If it is forgotten, the level of weed control can vary widely, and re-spraying may be necessary.

Most products have adjuvants built into the formulation (e.g. Puma). Other require adjuvant addition (e.g. Refine Extra). Some adjuvants were developed specifically for one herbicide, and these are either pre-packaged with the herbicide, or are identified by name on the label (e.g. Turbocharge for Achieve 40 DG, Amigo for Select).

With some products, adjuvants need to be added only under certain conditions. For example, glyphosate products have built-in adjuvants, but require additional adjuvant when low rates (pre-seeding or chem-fallow), high water volumes, or certain tank mixes are used.

Adjuvants should be added only when required. If one is not required, addition can reduce weed control or injure crops. Product labels will describe when an adjuvant is required, and what type should be used.

There are two main classes of adjuvants: "activators or spray modifiers" (these include surfactants and crop oils), and "utility modifiers" (these include pH adjusters, water conditioners, low-drift adjuvants, and anti-foaming agents). The most important class of adjuvants is the activators. Surfactants, the main group within the activators, are *"surface active agents."* These chemicals produce effects at points where two substances touch, such as between two liquids (herbicide and water) or between a solid and a liquid (herbicide and leaf surface). Some surfactants act as dispersing agents, helping to keep a pesticide suspended in water. Others work on the plant, improving the wetting, sticking and penetrating characteristics of the herbicide droplets. Oil-based adjuvants contain petroleum or vegetable oil plus an emulsifier that suspends the oil in tiny droplets within the spray solution. Oil-based adjuvants typically assist in herbicide penetration into the leaf.

There are two basic type of surfactants (ionic and non-ionic), of which the non-ionic are most common. The following table lists the surfactants registered for use with herbicides in western Canada.

Surfactant and Herbicide Registrations:

SURFACTANT	TYPE	HERBICIDE
Agral 90/ Agsurf	Non-ionic	Ally, Escort, Glyphosate, Muster, Pinnacle, Pursuit, Prism, Refine Extra, Reglone, Unity
Citowett Plus	Non-ionic	Ally, Basagran (peas), Escort, Muster, Prism, Refine Extra, Unity
Companion	Non-ionic	Ally, Muster, Refine Extra, Unity
Enhance	Blend of Ionic and Non-ionic	Glyphosate
Frigate XL	Ionic	Glyphosate
Super Spreader Sticker	Non-ionic	Ally, Unity
LI 700	Non-ionic	Glyphosate

Oil-Based Adjuvants and Herbicide Registrations:

OIL-BASED ADJUVANTS	
TRADE NAME	**HERBICIDE**
Amigo	Select
Assist	Basagran (all crops), Laddok
Bioveg	Bladex 90 DF
Crop oil or Corn oil	Atrazine
Hi-Mix, Sure-Mix	Assure II, Freedom Gold, Muster Gold II
Merge	Accord, Anthem, Flaxmax Ultra, Odyssey, Poast Ultra, Sundance
Score	Horizon
Turbocharge	Achieve, Venture
XA Oil Concentrate	Basagran

Crop and Herbicide Recommendation Tables

The ratings in the following charts give general comparisons based on rates, timing and other application instructions and precautions as outlined in this Guide.

The ratings for crop tolerance and weed control are explained below. Where ratings are not given, a dot (•) will indicate if the weed is listed on a product label. Where rate ranges are listed for controlling a given weed, ratings are based on results achieved with the higher rate.

RATING	CROP TOLERANCE	WEED CONTROL
E - Excellent	Consistently exhibits a high degree of tolerance over a wide range of growing conditions.	Consistently provides a high degree of control over a wide range of growing conditions.
G - Good	Exhibits good crop tolerance under most growing conditions.	Provides good control under most growing conditions.
F - Fair	Tolerance is acceptable depending on growing conditions.	Control is acceptable depending on growing conditions.
P - Poor		Provides suppression, but control is often unacceptable.

All ratings are primarily based on the use of the herbicides on their own. Tank mixing herbicides may reduce the control of one or both tank mix partners, or result in a reduced level of crop safety.

Weed Control Tables

Table 1. Weed Control in Barley

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Corn	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D	45	G								G	P	E			E		E			G	E		E	P	P				P
Accord[9]	50	E	G	E[7]					E																		G		
Achieve	52	G	F	G	G																								
Achieve Extra Gold	54	G	F	G	G	E	F			G		G		G	E		E	G		G	G	G	G	P	P			G	G
Avadex BW/MicroActiv	70	E			G																								
Ally Toss-N-Go + 2,4-D	56	G				F		G				E	G	G	E		E	E		G	E	G	E	F	F			G	
Assert	62	E			G	P											G						G						
Attain	68	G				G		G	E	G	G[6]	E	G	E	E	E	E	E		G	G	G	E	P	P		E	E	
Avenge	74	G			G																								
Banvel II +MCPA/2,4-D	76	F				G			G	G	P	E	P[2]	G	E		E	G		G	E	G	E	F	F			G	F
Buctril M	84	E				E	F			G		G		G	E		E	G		G	G	G	G	P	P			G	G
Champion Extra	87	G	G	E	G	G		E	F				E	E	E	F	E	E		E	G	E	E	F	F			G[4]	
Champion Plus	88	G		E	G	G		G		G		E	E	F	E		E	E		G	E	E	E		P			G[4]	E
Curtail M	91	G				G					G[6]	E		P	E		E	F			E	F	E	G	G			F	G
Dichlorprop + 2,4-D	93	G				G	G			G		E		G	E	F	E	G		G	E	G	E	F	F			G	G
DyVel	98	F				G			F	G		E	F	G	E		E	G		G	E	G	E	F	F			F	F
DyVel DS	99	F				G			F	G		E		G	E	F	E	G		G	E	G	E	F	F				F
Express Pack	112	G				F						E		G	E		E	G		G	E		E		F				G
Fortress	115	G		G	G	P								P	P			P		P									
Glyphosate (preharvest)	130										G[8]								G					F	G	•			
Hoe-Grass 284	140	G	G	G	G																					F			
Hoe-Grass II	142	G	G	G	G	G	P							F	G		F	F		G		G	F			F			
Linuron + MCPA amine	155	F		P		G		G		G		E	F	G	E		E	G			E	F	E						
Lontrel	158	E				G																		G	G				
MCPA	160	E								G	P	E			E		E				E		E	P	P				P
MCPAK	160	E								G		E	F		E		E				E		E	P	P				
Mecoprop	165	G						E	G						E		E								P				
Pardner	170	E				G				F				F	G		F	F		G		G	F						
Prestige	177	E				E		G	E		G[6]	E	G	E	E	E	E	G			E	G	E	E	E		E	E	E
Prevail	179	G		G	G	F					G[6]	E		P	E		G	F			E	F	E	F	G			F	
Puma™ Super/Puma Super	186	G	G	E[7]	G																								
Refine Extra Toss-N-Go	191	E				G		E	F			E	E	E	E	F	E	E		E	G	E	E	F	F			G[4]	G
Sencor	204	F					G	G					F		G		G	F		G		G	G					G	
Stampede EDF + MCPA/2,4-D or Refine Extra	209	F		G		G				G[2]		G		F	E		G	G		G[2]	G	G	G					G	G[2]
Target	213	F				G	G		G			E	F	G	E		E	G		G	E	G	E	F	F			G	G
Thumper	215	E				E	F			G		E		G	E		E	G		G	G	G	G					G	G
Trifluralin (foxtail control)	218	E		G																									
Trifluralin (grassy and broadleaf)	223	F	G	G	F	F		G							G			G		G									
Unity[1]	228	E				G		G	G			G	E	G	G		E	G			G	G	E					G	

[1] Not for use in Manitoba. [2] 2,4-D mixes only. [3] MCPA K mixes only. [4] May not give satisfactory control of CLEARFIELD canola varieties. [5] Will not control CLEARFIELD canola varieties. [6] Spring seedlings only. [7] Green Foxtail only. [8] Not registered for control with all glyphosate products. See glyphosate sections for details. [9] Not for use on malting barley. • Registered for control, ratings not yet developed.

Table 2. Weed Control in Oats

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
Banvel II + MCPA	76	F				G			G	G	P	E	P	G	E		E	G		G	E	G	E	F	F		G	F
Buctril M	84	E				E	P			G		G		G	E		E	G		G	G	G	G	F	P		G	G
Curtail M	91	G				F					G[4]	E		P	E		G	F			E	F	E	F	G		F	G
DyVel	98	F				G			F	G		E	F	G	E		E	G		G	E	G	E	F	P		F	F
Linuron + MCPA amine	155	F		P		G		G		G		E	F	G	E		E	G			E	F	E					
Lontrel	158	G				F																		F	G			
MCPA	160	E								G	P	E			E		E				E		E	P	P			P
MCPAK	160	E								G		E	F		E		E				E		E	P	P			
Mecoprop	165	G						E	G						E		E								P			
Pardner	170	E				G				F				F	G		F	F		G		G	F					
Refine Extra Toss-N-Go	191	G				G		E	F			F	E	E	E	F	E	E		E	G	E	E	F	F		G[3]	•
Glyphosate (pre-harvest)[5]	130										G[6]								G					F	G			
Stampede EDF + MCPA/Refine Extra	209	F		G		G						G		F	E		G	G			G	G	G				G	
Target	213	F				G	G		G			E	F	G	E		E	G		G	E	G	E	F	F		G	G

[1] MCPAK mixes only. [3] Will not control CLEARFIELD canola varieties. [4] Spring seedlings only. [5] Not all products registered for use in oat. See glyphosate sections for details. [6] Not registered for control with all products. See glyphosate sections for details. • Registered for control, ratings not yet developed.

Table 3. Weed Control in Rye or Triticale

HERBICIDE	PAGE	Crop Tolerance - Rye	Crop Tolerance - Triticale	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Corn	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D[3,4]	45	G									G	P	E			E		E			G	E		E	P	P				
Achieve[3]	52	G	G	F	G	G																								
Achieve Extra Gold[1,4]	54	G	G	F	G	G	E	F			G		G		G	E		E	G		G	G	G	G	P	P			F	G
Avenge[3]	74	G	G			G																								
Banvel II + 2,4-D[3,4]	76	F					G			G	G	P	E		G	E		E	G		G	E	G	E	F	F			G	G
Buctril M[1,4]	84	E					E	F			G		G		G	E		E	G		G	G	G	G	P	P			G	G
Hoe-Grass 284[3]	140	G	G	G	G	G																					F			
Hoe-Grass II[2]	142	G	G	G	G	G	G	P							F	G		F	F		G		G	F			F			
MCPA[1,4]	160	E									G	P	E			E		E				E		E	P	P				P
Pardner[3]	170	E	E				G				F				F	G		F	F		G		G	F						

[1] Fall rye only. [2] Spring rye only. [3] Fall and Spring rye. [4] Rye only; not registered for triticale.

Table 4. Weed Control in Winter Wheat

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's-Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Corn	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D	45	G								G	P	E			E		E			G	E		E	P	P				
Achieve	52	G	F	G	G																								
Achieve Extra Gold	54	G	F	G	G	E	F			G		G		G	E		E	G		G	G	G	G	P	P			G	G
Avenge	74	G			G																								
Banvel II + MCPA/2,4-D	76	F				G			G	G	P	E	P	G	E		E	G		G	E	G	E	F	F			G	F
Buctril M	84	E				E	F			G		G		G	E		E	G		G	G	G	G	P	P			G	G
Dichlorprop + 2,4-D	90	G				G	G			G		E		G	E	F	E	G		G	E	G	E	F	F		P	G	G
DyVel	98	F				G			F	G		E	F	G	E		E	G		G	E	G	E	F	F			F	F
DyVel DS	99	F				G			F	G		E		G	E	F	E	G		G	E	G	E	F	F			•	F
Hoe-Grass 284	140	G	G	G	G																					F			
MCPA	160	E								G[1]	P	E			E		E				E		E	P	P				P
Pardner	170	E				G				F				F	G		F	F		G		G	F						
Refine Extra Toss-N-Go	191	G				G		E	F				E	E	E	F	E	E		E	G	E	E	F	F			G[2]	•
Sencor	204	F										F									F		G						
Target	213	G				G	G		G			E	F	G	E		E	G		G	E	G	E	F	F			G	G

[1] MCPAK mixes only. [2] Will not control CLEARFIELD canola varieties.

Table 5. Weed Control in Spring Wheat

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Corn	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D	45	G								G	P	E			E		E			G	E		E	P	P				
Accord	50	E	G	E[1]					E																		G		
Achieve	52	G	F	G	G																								
Achieve Extra Gold	54	G	F	G	G	E	F			G		G		G	E		E	G		G	G	G	G	P	P			G	G
Ally Toss-N-Go + 2,4-D	56	G				F		G				E	G	G	E		E	E		G	E	G	E	F	F			G	
Anthem (includes 2,4-D tank mix)	60	G		F	G	G		E	E		G			G	E		E	E	F			G	E	G				E	
Assert	62	G			G	P											G						G						
Attain[7]	68	G				G		G	E	F	G[6]	E	G	E	E	G	E	E		G	G	G	E	P	P		G	E	
Avadex BW/MicroActiv	70	G			G																								
Avenge[7,8]	74	G			G																								
Banvel II + MCPA/2,4-D	76	G				G			G	G	P	E	F	G	E		E	G		G	E	G	E	F	F			G	F
Basagran + 2,4-D	79	E								G					G		E	F		G	E		E					E	
Buctril M	84	E				E	F			G		G		G	E		E	G		G	G	G	G	P	P			G	G
Curtail M	91	G				G					G[6]	E		P	E		E	F			E	F	E	G	G			F	G
Dichlorprop + 2,4-D	93	G				G	G			G		E		G	E	F	E	G		G	E	G	E	F	F		F	G	G
DyVel	98	G				G			F	G		E	F	G	E		E	G		G	E	G	E	F	F			F	F
DyVel DS	99	G				G			F	G		E		G	E	F	E	G		G	E	G	E	F	F			•	F
Everest	110	G		E	G																								
Express Pack	112	G				F						E		G	E		E	G		G	E		E		F				G
Fortress	115	F		G	G	P								P	P			P		P									
Glyphosate (preharvest)	130										G[4]								G					F	G				
Harmony Total	138	G			E	G		E	F			E	E	E	E	F	E	E		E	G	E	E	F	F			G[5]	
Heritage[7]	218	G	•	E	G	F									G														
Hoe-Grass 284	140	G	G	G	G																					F			
Hoe-Grass II	142	G	G	G	G	G	P							F	G		F	F		G		G	F			F			
Horizon	144	G	•	G	E																								
Horizon BTM	146	G		•[1]	E	E	F			G		G		G	E		E	G		G	G	G	G	P	P			G	G
Laser DF[9]	151	G		G[1]		G		G		G		G	E	F	E		E	E		G	G	G	G	P	P			G[5]	G
Linuron + MCPA amine	155	F		P		G		G		G		E	F	G	E		E	G			E	F	E						
Lontrel	158	E				G																		G	G				
MCPA	160	E								G	P	E			E		E				E		E	P	P				P
MCPAK	160	E								G		E	F		E		E				E		E	P	P				
Mecoprop	165	G						E	G						E		E								P				
Pardner	170	E				G				F				F	G		F	F		G		G	F						
Prestige	177	E				E		G	E		G[6]	E	G	E	G	G	E	G			E	G	E	E	E		G	E	G
Prevail	179	G		G	G	P					G[6]	E		P	E		G	F			E	F	E	F	G			F	
Puma[10] Super/Puma Super	186	G	G	F[1]	G																								
Refine Extra Toss-N-Go	191	E				G		E	F			E	E	E	E	F	E	E		E	G	E	E	F	F			G[5]	G
Roundup Fast Forward (preharvest)	199																		G						G				
Sencor	204	F					G	G					F		G		G	F		G		G	G					G	
Stampede EDF + MCPA or 2,4-D or Refine Extra	209	F		G		G				G[2]		G		F	E		G	G		G[2]	G	G	G					G	G
Sundance	211	G		F	G			E	E								E	E	F				E					G[5]	
Target	213	G				G	G		G			E	F	G	E		E	G		G	E	G	E	F	F			G	G
Thumper	215	E				E	F			G		E		G	E		E	G		G	G	G	G					G	G
Trifluralin (foxtail control)	218	E		G																									
Triumph Plus[7,8]	226	G		E	G	G		G		G		E	E	F	E		E	E		G	E	E	E		P			G[5]	E
Unity[9]	228	E				G		G	G			G	E	G	G		E	G			G	G	E					G	

[1] Green foxtail only. [2] 2,4-D mixes only. [3] MCPA K mixes only. [4] Not registered for control with all products. See glyphosate sections for details. [5] Will not control CLEARFIELD canola varieties. [6] Spring seedlings only. [7] Not registered for durum wheat. [8] Not recommended for all spring wheat varieties. Check product listing for details. [9] Not for use in Manitoba. [10] Tank mix with 2,4-D ester when applying to durum wheat. • Registered for control, ratings not yet developed.

Table 6. Weed Control in Corn

HERBICIDE	PAGE	Barnyard Grass	Cereal Grains	Foxtail, Green	Foxtail, Yellow	Wild Oats	Quackgrass	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species, Lady's-thumb	Sow Thistle (Perennial)	Stinkweed	Sunflower, Volunteer	Thistle, Canada	Volunteer Canola
2,4-D	46											•	S	•		•	•		•	•			•	S		
Accent	49	•		•	S	•	•																			
Atrazine	66					•		•								•	•	•			•					
Banvel II	76							•			•				•	•	•	•			•	S			S	
Banvel II + 2,4-D amine	76							•			•	•	S	•	•	•	•	•	•	•	•	S	•	•	S	•
Basagran	79									•		•				•	•	S	•	•	•		•		S	
Bladex	82	•		•	•			•							•	•	•	•	•	•	•					
Buctril M	84							•	•			•		•	•	•	•	•	•	•	•		•	•		•
Dual II Magnum	95	•		•	•													S								
DyVel DS	99							•			S	•		•		•	•	•	•	•	•		•		S	•
Eradicane	107	•	•	•	•	•	S			•						•		•								
Frontier	119			•																						
Laddok	149									•		•				•	•	•	•		•					
MCPB + MCPA	163															•	•	•		•		S	•		S	•
Pardner	170							•				•			•	•	•	•	•		•		•			
Primextra II Magnum	180	•		•	•			•								•	•	•			•					
Roundup Transorb[1]	123	•		•	•		•	•				•				•	•	•			•					

• Controlled S – Suppression

[1] For use on Roundup Ready varieties only.

Table 7. Weed Control in Peas

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp Nettle	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Barley	Volunteer Wheat
Assure II	64	E	G	F[1]	G													F							E	E
Avadex BW	70	E			G																					
Basagran	79	F						F	F	F					F	F	P		F	F	F	F		P		
Edge	102	G	E	E	G	G	•	G	P				P	G	E		G		P		P				P	F
Fusion	121	E	G	F[1]	G																				E	E
Glyphosate (preharvest)	130										G[2]							G					F	G		
Hoe-Grass 284	140	G	G	G	G																					
MCPA Sodium Salt/Amine	160	F										P			P	G				P		P				
MCPB + MCPA	163	F											F		G	G	G			G		G	P	P		
Odyssey	169	G	G	F[1]	G	P		E	E			E	F	G	P	E	E		E	E	G	E			G	G
Pea Pack	172	G													G	E	G					G				
Poast Ultra	175	E	E	E	G													F							E	E
Pursuit	188	G		F[1]	F	G		G	G				G		P	E	G			G	G	E				
Pursuit Ultra	190	G	E	E	G	P		G	G				F			E	G	F			F	G			E	E
Roundup Fast Forward (preharvest)	199																	G						G		
Select	202	E	E	E	G													F							E	E
Sencor	204	F						G					F		G	G					G	G				
Trifluralin	218	G	G	G	F	F		G							G		G		G							
Venture DG/Venture L	232	E	E	F	G													F							E	E

[1] Green foxtail only. • Registered for control, ratings not yet developed.

[2] Not registered for control with all products. See glyphosate sections for details.

Table 8. Weed Control in Other Pulses

HERBICIDE	PAGE	CROP						ANNUAL WEEDS																				PERENNIALS			
		Bean, Dry	Fababean	Lentil	Chickpea	Soybean	Sweet White Lupin	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Wild Oat	Buckwheat, wild	Chickweed	Cleavers	Cocklebur	Hempnettle	Kochia	Lamb's-quarters	Mustard, Wild	Nightshade, Hairy	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Volunteer Barley	Volunteer Wheat	Canada Thistle	Dandelion	Perennial Sow-thistle	Quackgrass
Assure II	64			X		X		G	E		G															E	E				F
Basagran	79	X	X			X							F	F	F			F	F	F	P	F	F	F	F			P			
Dual II Magnum	95	X				X	X	G	G	G											P										
Edge	102	X		X		X		E	E	E	G	G	G	P		P	G	E			G	P		P		P	P				
Eptam	105	X						G	G	G	G		G					G			G					F	F				
Frontier[1]	119	X							•																						
Fusion	121			X				G	E		G															E	E				
Glyphosate (preharvest)	130	X		X		X																						G	G[4]	F	G
Hoe-Grass 284	140	X	X	X		X		G	G	G	G																				
Linuron	155					X[2]	X[2]	S	•	•		•	•								•		•	•	•						
Pinnacle	173					X												•	•		•			•							
Poast Ultra	175	X	X	X	X	X		E	E	E	G															E	E				F
Pursuit[3]	188	X																		G											
Roundup FastForward (preharvest)	199	X		X																								G			G
Select	202			X	X	X		E	E	E	G															E	E				
Sencor (post-emergence)	204			X	X								F			F		F	F					F	F						
Sencor + Treflan (PPI)	204		X			X		G	G	G	F	F	G			F		G	G		G	G	G	G	G						
Sencor + Edge (PPI)	204		X					G	E	E	G	G	G	F		F	G	E	F		G	F		G	F	F	F				
Trifluralin	218	X	X	X		X		G	G	G	F	F	G					G			G	G									
Venture DG/Venture L	232			X		X[1]		E	F	F	G															E	E				F

[1] White and Kidney beans only. [2] Pre-emergent surface treatments only. [3] Pinto, pink an Red beans only. (Refer to Pursuit section (p 170) for full list of weeds controlled).
[4] Not registered for control with all products. See product section for details. • Registered for control, ratings not yet developed (S) Registered for suppression.

Table 9. Weed Control in Flax and Solin (Low Linolenic Acid Varieties). Not all products are registered for use on Solin.

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp Nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Barley	Volunteer Wheat
Assure II[1]	64	E	G	E		G														F							E	E
Avadex BW	70	E				G																						
Basagran	79	F							F	F	F					F		F	P		F	F	F	P		P		
Buctril M[1]	84	F					E	F			G		G		G	E		E			G	G	F	G	P	P		
Eptam[3]	105	F	G	G	G	G			G							G			G								F	F
FlaxMax Ultra	113	F	E	E	E	G	F					G[2]	E			E		E	P			E	P	E	P	F	G	G
Fortress	115	G		G	G	G	P								P	P			P		P							
Fusion	121	E	G	E		G																					E	E
Glyphosate (preharvest)[4]	130											G[5]								G					F	G		
Hoe-Grass 284	140	G	G	G	G	G																						
Hoe-Grass II	142	F	G	G	G	G	G	P							F	G		F	P		G		G	F				
Lontrel	158	E					E																		E	G		
MCPA/MCPAK	163	F									G	P	E	F		E		E				E		E	P	P		
Pardner[1]	170	F					G				F				F	G		F	F		G		G	F				
Poast Ultra[1]	175	E	E	E	E	G														F							E	E
Roundup Fast Forward (preharvest)	199																			G						G		
Select[1]	202	E	E	E	E	G														F							E	E
Stampede EDF + MCPA	209	F		G	G		G						G		F	G		G	G			G	G	G				
Trifluralin	218	F	G	G	G	F	F		G							G			G		G							
Venture DG/Venture L	232	E	E	F	F	G														F							E	E

[1] Registered for use on Solin (low linolenic acid varieties). [2] Spring seedlings only. [3] Not recommended for use on flax in Saskatchewan. [4] Not all products registered for use in flax. See glyphosate sections for details. [5] Not registered for control with all products. See glyphosate sections for details.

Table 10. Weed Control in Canola

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Barley	Volunteer Wheat
Assure II	64	E	G	E		G														F							E	E
Avadex BW	70	E				G																						
Compas 480EC⁶	90						G				F				F	G		F	F		F		G	F				
Eclipse⁴	101			•		•	•	•	•	•		S		•	•	•		•	•	•⁷	•	•		•	S	•⁷	•	•
Edge	102	G	E	E	E	G	G		G	P				P	G	E			E		P		P				P	P
Fortress	115	G		G	G	G	P								P	P			P		P							
Freedom Gold⁴	117	F	E	E		G	G		E					E	E	E		E	E	F	G		E	E			E	E
Fusion	121	E	G	E		G																					E	E
Glyphosate⁴,⁵	123	E	E	E	E	E	F	G	E	E		S	•	E	E	E	G	E	E	S	E	E	E	E	F	F	E	E
Glyphosate (preharvest)	130											G⁵								G					F	G		
Hoe-Grass 284	140	G	G	G	G	G																						
Liberty¹	153	G		G		G	G		G	G				G	G	G		G	G	F	G	G	G	G	G	F	P	G³
Lontrel	158	G					G																		G	E		
Muster Gold/Muster Gold II	166	G	G	E		G							G	G				G	P	F			G	F			E	E
Muster Toss-N-Go	167	G											G	G				G	P				G	F				
Odyssey²	169	G	G	E		G	F		E	E			E	G	G	P		E	E		E	E	G	E			G	G
Poast Ultra	175	E	E	E	E	G														F							E	E
Pursuit²	188	E		G		F	G		G	G						P		E	G				G	E			P	P
Pursuit Ultra²	190	G	E	E	E	G	F		G	G				F				E	G	F			F	G			E	E
Roundup Fast Forward (preharvest)	199																			G						G		
Select	202	E	E	E	E	G														F							E	E
Trifluralin	218	E	G	G	G	F	F		G							G			G		G							
Venture DG/Venture L	232	E	E	F	F	G														F							E	E

[1] For use only on Liberty Link varieties. [2] For use only on CLEARFIELD canola varieties. [3] Ratings based on 1.3 L/acre rate of Liberty. Control may be reduced at lower rates. [4] For use only on Roundup Ready canola varieties. [5] Not registered for control with all products. See glyphosate sections for details. [6] For use on Navigator canola varieties. [7] Season long control. • Registered for control, ratings not yet developed. S – Suppression.

Table 11. Weed Control in Potatoes

HERBICIDE	PAGE	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Quackgrass	Chickweed	Dandelion	Hemp Nettle	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Pigweed, Prostrate	Purslane	Smartweed (Annual)	Shepherd's-purse	Stinkweed	Volunteer Corn	Volunteer Barley	Volunteer Wheat	Volunteer Canola	Volunteer Triazine Tolerant Canola
Dual II*◆	95	•	•								S										
Eptam 8-E*◆	105	•	•	•	S	•			•		•	•	•					•	•		
Glyphosate (preplant use only)*◆	123		•	•	•		•	•	•	•	•			•	•	•	•¹	•	•	•¹	•
Gramoxone/Gramoxone PDQ (pre-emergent use only)*◆	135	•	•	•	S	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•
Hoe-Grass 284◆	140	•	•	•													•				
Linuron (pre-emergent use only)◆	155	S	•			•			•		•		•	•	•	•					
Poast Ultra*◆	175	•	•	•	S												•	•	•		
Prism*◆	182	•	•		•				S		•										
Reglone (desiccant use only)*◆	193																				
Select*◆	202	•	•	•													•	•	•		
Sencor*◆	204					•		•	•	•	•			•	•	•				•	
Venture L	232	•	•	•	S												•	•	•		

[1] Not including Roundup Ready varieties. • Controlled S – Suppression

* Approved for use by Midwest Food Products

◆ Approved for use by McCains

Table 12. Weed Control in Sunflowers

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Barley	Volunteer Wheat
Assert	62	F															G					G				
Edge	102	G	E	E	G	G		G	P				P	G	E			E		P	P				P	P
Eptam 8E	105	G	G	G	G			G							G			G							F	F
Hoe-Grass 284	140	G	G	G	G																					
Poast Ultra	175	E	E	E	G																					
Select	202	E	E	E	G														F						E	E
Trifluralin	218	E	G	G	F	F		G							G			G		G						
Venture DG/Venture L	232	E	E	F	G														F						E	E

Table 13. Weed Control in Special Crops

HERBICIDE	PAGE	CROP						ANNUAL WEEDS																							PERENNIALS			
		Canaryseed	Safflower	Caraway	Coriander	Buckwheat	Mustard	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Wild Oat	Buckwheat, wild	Catchfly, night-flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Volunteer Barley	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Wheat	Canada Thistle	Dandelion	Perennial Sow-thistle	Quackgrass
Accord	90	X						G	E						E													G						
Avadex BW	70	X[1]					X				G																							
Avenge	74	X									G																							
Banvel II + MCPA	76	X										G			G	G	E	F		E	E	G	G	E	G	E		P	G		F	P	F	
Buctril M	84	X										E	F			G	G		G	E	E	G	G	G	G	G			G		P		P	
Edge	102		X	X	X		X[2]	E	E	E	G	G		G	P			P	G	E		G	P		P		P			F				
Fortress	115						X		G	G	G	P							P	P			P	P										
Fusion	121						X	G	E		G																							
Hoe-Grass 284	140					X	X	G	G	G	G																							
Linuron (Afolan F only)	155			X	X																													
Muster Toss-n-Go	167						X[3]										G	G			G				G	F								
Pardner	170	X										G				F			F	G	F	F	G		G	F								
Poast Ultra	175		X	X	X	X		E	E	E	G																E			E				F
Select	202						X	E	E	E	G																E			E				F
Stampede EDF + MCPA	209	X							G	G		G					G		F	E	G	G		G	G	G								
Target	213	X										G	G		G		E	F	G	E	E	G	G	E	G	E					F		P	
Trifluralin	218		X				X	G	G	G	F	F		G						G		G	G											
Venture DG/Venture L	232						X	E	F	F	G																E			E				F

[1] Granular formulation only. [2] Yellow mustard only. [3] Brown and oriental only.

Table 14. Weed Control Before Crop Emergence

HERBICIDE	RATE L/acre	PAGE	Brome, Downy	Buckwheat, Wild	Cocklebur	Dandelion	Flixweed	Foxtail Barley	Foxtail, Green	Hemp-nettle	Kochia	Lady's-thumb	Lamb's-quarters	Mustard, Wild	Narrow-leaved Hawk's Beard	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's Purse	Stinkweed	Thistle, Canada	Thistle, Sow (Perennial)	Volunteer Cereals	Volunteer Canola	Volunteer Flax	Wild Oats
Amitrol 240	2.0 to 8.1	58				•															S	S				
Amitrol 240 + Roundup	2.0 + 0.5	58	•			•	•		•	•		•	•	•		•		•		•			•	•	•	•
Banvel II + Glyphosate	0.13 + 0.38	76	•	•			•	S	•		•	•	•	•		•		•		•			•	•		•
Glyphosate + Pardner	0.4 + 0.45	170		•				S	•		•	•	•	•				•		•			•	•		•
Glyphosate	0.5 to 1.0	123	•	•			•	S	•	•	•	•	•	•	•	•	•	•	•	•			•	•[1]	•	•
Gramoxone**	2.2	135	•	•	•		•	S	•	•	•	•	•	•	•	•		•	•	•			•	•	•	•
Gramoxone PDQ		136	•	•			•	•	•	•	•	•	•	•	•	•		•	•	•			•	•	•	•
Rustler*	1.0 to 1.3	201	•	•			•	S	•		•	•	•	•		•		•		•			•	•		•

• Controlled S – Suppression *Prior to seeding wheat, barley, rye, oats and field corn (not sweet corn). ** Prior to crop emergence in beans, corn, potatoes, peas, and soybeans. [1] Not including Roundup Ready varieties.

Table 15. Weed Control in Summerfallow (Chem Fallow)

HERBICIDE	RATE L/acre	PAGE	Brome, Downy	Buckwheat, Wild	Dandelion	Flixweed	Foxtail Barley	Foxtail, Green	Kochia	Lady's-thumb	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Stinkweed	Thistle, Canada	Thistle, Sow (Perennial)	Volunteer Cereals	Volunteer Canola	Wild Oats
Banvel II + 2,4-D	0.12 + 0.45	76		•		•			•	•	•	•	•		•	•	S	S			
DyVel DS	0.71	99		•		•			•	•	•	•	•		•	•	S			•	
Express Pack	40 acres/pack	112				•										•					
Heritage[1]	0.52 to 8.9 kg/acre	218		•				•			•		•		•						•
Lontrel	0.34	158		•													•	S			
Glyphosate	0.5 to 1.0	123	•	•		•	S	•	•	•	•	•	•		•	•			•	•[2]	•
Glyphosate + 2,4-D amine (500 g/L)	0.40 + 0.49	123				•		•	•	•	S	•	•		S	•			•	•	•
Glyphosate + Banvel II	0.40 + 0.12	123		S		•		•	•	•	•	•	S		•	•			•	•[2]	•
Glyphosate + Pardner	0.40 + 0.51	123		•				•	S	•		•	S			•			•	•	S
Rustler	1.0 to 1.3	201	•	•		•	S	•	•	•	•	•	•		•	•			•	•[2]	•
Target	0.81	213		•		•			•	•	•	•	•		•	•	S	S		•	

• Controlled S – Suppression [1] Not for use in Manitoba. [2] Not including Roundup Ready canola.

Table 16. Weed Control in Fall Stubble

HERBICIDE	PAGE	Flixweed	Narrow-leaved Hawk's Beard	Shepherd's-purse	Stinkweed	Canada Thistle	Quackgrass	Dandelion
2,4-D	45	•		•	•	S		S
2,4-DB	47		•					
Amitrol 240	98					S		
Banvel II	76					S		S
Banvel II + Glyphosate	76	•		•	•	S	S	
DyVel DS	99	•		•	•	S		
Glyphosate	123					S	•	•
MCPA	160	•		•	•	S		S
Target	213	•		•	•	S		

• Controlled
S – Suppression. Levels of suppression vary depending on the product and growing conditions in the fall. Regrowth and in-crop treatments can be expected.

Table 17. Weed Control in Grass Pastures and Hayfields

HERBICIDE	RATE L/acre or kg/acre	PAGE	Absinth	Bindweed, Field	Burdock	Canada Thistle	Dandelion	Dock, Curled	Daisy, English	Flixweed	Foxtail Barley	Gumweed	Hawk's Beard, Narrow-leaved	Knapweed	Leafy Spurge	Nodding Thistle	Poplar	Pussy Toes	Red Bartsia	Sage, Pasture	Sow-thistle, Perennial	Snowberry	Stinkweed	Tansy	Wild Rose	Willow	Wormwood, Biennial
2,4-D (500 g/L)	0.57 - 1.82	45	□	□	•	□	□	•		•		□			□	□	□	□	•	□	□	□	•				
2,4-DB	0.71 - 1.72	47		□		□		■					■								□		•				
Banvel II	0.85 - 1.86	76		□		□	□	□	□					□	□					□	□			□			
Banvel II + 2,4-D	0.85 + 0.89 - 1.62	76	□	□	•	□	□	□	□	•		□			□	□	□		•	□	□	•	•	□	•	□	
DyCleer	0.51 - 3.73	96	□	•		•		□	•					•	□					•	□						
Escort	0.010 - 0.012	108				□	•														□	•		•	■		
Kerb	0.36 - 0.45	147									•																
MCPA (500 g/L)	0.7 - 1.9	160		□		□	□	□		•		□			■						□		•	□			•
MCPB + MCPA	1.11 - 1.72	163		□																	□		•				
Remedy EC	1 - 8	197		■	•		•	•									•								•	•	
Tordon 22K	0.45 - 3.64	216		■		•								•	■					•							

• Controlled. ■ Controlled by the highest rate within this range. □ Top growth suppression.

Table 18. Weed Control in Shelterbelts

	USE				SHELTERBELT SPECIES											
HERBICIDE	PAGE	Before Planting	After Planting (New & Established)	Established	American Elm	Birch	Caragana	Crabapple	Green Ash	Juniper	Lilac	Manitoba Maple	Poplar	Scots Pine	Siberian Elm	Willow
Amitrol 240	58			●	●	●	●	●	●	●	●	●	●	●	●	●
Casoron	86		●		●		●	●	●	●	●	●			●	●
Glyphosate	123	●		●	●	●	●	●	●	●	●	●	●	●	●	●
Gramoxone	135		●		●	●	●	●	●	●	●	●	●	●	●	●
Linuron	155			●	●		●		●			●		●	●	●
Simazine	208			●	●		●		●			●			●	
Trifluralin Liquids	218	●		●	●		●		●					●	●	

	WEEDS																				
HERBICIDE	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada
Amitrol 240	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Casoron		●		●	●						●	●	●	●	●		●	●			
Glyphosate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Gramoxone	●	●	●	●	●	●	●		●	●	●	●	●	●		●	●	●	●		
Linuron	●	●		●	●						●	●		●				●	●		
Simazine	●	●[1]	●	●								●						●			
Trifluralin Liquids	●	●	●	●	●							●		●		●					

[1] Yellow foxtail only.

Herbicide Formulations and Companies

Product	*Common Name*	*Formulation*	*Company*
2,4-D	2,4-D	500, 600, 700 g/L SN, EC	Various
Accent	nicosulfuron	75% DF	DuPont
Accord	quinclorac	75% DF	BASF
Achieve	tralkoxydim	80% DG	Syngenta
Achieve Extra Gold	tralkoxydim + bromoxynil + MCPA E	40% DG + 280 g/L + 280 g/L EC	Syngenta
Advance	trifluralin	10% G	Dow AgroSciences
Afolan F	linuron	480 g/L F	Aventis CropScience
Ally Toss-N-Go	metsulfuron methyl	60% DF	DuPont
Amitrol 240	amitrole	240 g/L SN	Nufarm
Anthem	sulfosulfuron + 2,4-D E	75% DG + 700 g/L EC	Monsanto
Assert 300 SC	imazamethabenz	300 g/L SC	BASF
Assure II	quizalofop-p-ethyl	96 g/L EC	DuPont
Atrazine	atrazine	480 g/L F 90% DG	Syngenta, UAP Syngenta
Attain	fluroxypyr + 2,4-D E	180g/L + 564 g/L EC	Dow AgroSciences
Avadex BW/MicroActiv	triallate	400 g/L EC, 10% G	Monsanto
Avenge 200-C	difenzoquat	200 g/L SN	BASF
Banvel II	dicamba	480 g/L SN	BASF
Basagran	bentazon	480 g/L SN	BASF
Bladex	cyanazine	480 g/L F, 90% DF	DuPont
Bonanza	trifluralin	400 g/L EC, 10% G	UAP
Buctril M	bromoxynil + MCPA E	280 g/L + 280 g/L EC	Aventis CropScience
Caliber	2,4-DB	400 g/L EC	UAP
Casoron	dichlobenil	4% G	UAP
Champion Extra	fenoxaprop-p-ethyl thifensulfuron methyl + tribenuron methyl	92 g/L EC 50% DF 25% DF	DuPont
Champion Plus	fenoxaprop-p-ethyl + MCPA E + 2,4-D E + thifensulfuron methyl	45 g/L + 210 g/L + 70 g/L EC + 75% DF	DuPont
Clovitox Plus	MCPB + MCPA	375 g/L + 25 g/L SN	IPCO
Cobutox 600	2,4-DB	600 g/L EC	IPCO
Compas 480 EC	bromoxynil	480 g/L EC	Aventis CropScience
Compitox	mecoprop	150 g/L SN	Nufarm
Credit	glyphosate	356 g/L SN	Nufarm
Curtail M	clopyralid + MCPA E	50 g/L + 280 g/L EC	Dow AgroSciences
Dichlorprop-D	dichlorprop + 2,4-D E	300 g/L + 282 g/L EC	IPCO
Dual II Magnum	metolachlor	935 g/L EC	Syngenta
DyVel	dicamba + MCPA K	84 g/L + 336 g/L SN	BASF
DyVel DS	dicamba + 2,4-D A + mecoprop	110 g/L + 295 g/L + 80 g/L SN	BASF
Eclipse	glyphosate + clopyralid	360 g/L SN + 360 g/L SN	Dow AgroSciences
Edge	ethalfluralin	60% DG, 5% G	Dow AgroSciences
Embutox 625	2,4-DB	625 g/L EC	Nufarm
Eptam-8E	EPTC	800 g/L EC	Syngenta
Eradicane-8E	EPTC	800 g/L EC	Syngenta
Estaprop	dichlorprop + 2,4-D E	300 g/L + 282 g/L EC	Nufarm
Everest	flucarbazone-sodium	70% DG	Bayer
Express Pack	tribenuron methyl + 2,4-D E	75% DF + 700 g/L EC	DuPont
FlaxMax Ultra	sethoxydim + clopyralid + MCPA E	450 g/L EC + 50 g/L + 280 g/L EC	BASF
Fortress	triallate + trifluralin	10% + 4% G	Monsanto

Product	*Common Name*	*Formulation*	*Company*
Freedom Gold	quizalofop-p-ethyl + thifensulfuron methyl	96 g/L EC + 75% DF	DuPont
Frontier	dimethanamid	900 g/L EC	BASF
Fusion	fenoxaprop-p-ethyl + fluazifop-p-butyl	80.5 g/L + 125 g/L EC	Aventis CropScience
Glyfos	glyphosate	360 g/L SN	Cheminova
Gramoxone	paraquat	200 g/L SN	Syngenta
Gramoxone PDQ	paraquat + diquat	132 g/L + 66 g/L SN	Syngenta
Harmony Total	clodinafop propargyl + thifensulfuron methyl + tribenuron methyl	240 g/L EC 50% + 25% DF	DuPont
Heritage	trifluralin	5% G	Dow AgroSciences
Hoe-Grass 284	diclofop methyl	284 g/L EC	Aventis CropScience
Hoe-Grass II	diclofop methyl + bromoxynil	230 g/L + 80 g/L EC	Aventis CropScience
Horizon	clodinafop-propargyl	240 g/L EC	Syngenta
Horizon BTM	clodinofop propargyl + bromoxynil + MCPA E	240 g/L + EC + 280 g/L + 280 g/L EC	Aventis CropScience
Kerb 50W	propyzamide	50% WP	Rohm & Haas
Laddok	bentazon + atrazine	200 g/L + 200 g/L SN	BASF
Laser DF	fenoxaprop-p-ethyl + MCPA E + thifensulfuron methyl	28 g/L + 336 g/L EC + 75% DF	Aventis CropScience
Liberty	glufosinate ammonium	150 g/L SN	Aventis CropScience
Linuron 480	linuron	480 g/L F	UAP
Lontrel	clopyralid	360 g/L SN	Dow AgroSciences
Lorox DF	linuron	50% DF	DuPont
Maverick	glyphosate	356 g/L SN	Dow AgroSciences
MCPA	MCPA	300,400,500,564 g/L SN, EC	Various
Mecoprop	mecoprop	150 g/L SN	UAP
Muster Gold/Muster Gold II	ethametsulfron methyl + quizalofop-P-ethyl	75% DF + 96 g/L EC	DuPont
Muster Toss-N-Go	ethametsulfuron methyl	75% DF	DuPont
Odyssey	imazamox + imazethapyr	35% + 35% DG	BASF
Pardner	bromoxynil	280 g/L EC	Aventis CropScience
Pea Pack	metribuzin + MCPA Na	75% DG + 300 g/L SN	Bayer
Pinnacle	thifensulfuron methyl	75% DF	DuPont
Poast Ultra	sethoxydim	450 g/L EC	BASF
Prestige	fluroxypyr + clopyralid + MCPA E	180 g/L + 50 g/L + 280 g/L EC	Dow AgroSciences
Prevail	tralkoxydim + clopyralid + MCPA E	80% DG + 50 g/L + 280 g/L EC	Dow AgroSciences
Primextra II Magnum	metolachlor + atrazine	330 g/L + 170 g/L F	Syngenta
Princep Nine T	simazine	90% DG	Syngenta
Prism	rimsulfuron	25% DF	DuPont
Puma Super	fenoxaprop-p-ethyl	92 g/L EC	Aventis CropScience
Puma™ Super	fenoxaprop-p-ethyl	120 g/L EC	Aventis CropScience
Pursuit	imazethapyr	240 g/L SN	BASF
Pursuit Ultra	sethoxydim + imazethapyr	450 g/L EC + 240 g/L SN	BASF
Refine Extra Toss-N-Go	thifensulfuron methyl + tribenuron methyl	50% + 25% DF	DuPont
Reglone/Pro/240	diquat	200 g/L SN	Syngenta
Remedy	triclopyr	480 g/L EC	Dow AgroSciences
Renegade	glyphosate	356 g/L SN	Monsanto
Rival	trifluralin	60% DF, 500 g/L EC, 10% G	Aventis CropScience
Roundup Dry/Renew	glyphosate	65-68.5% DG	Monsanto
Roundup FastForward	glyphosate + glufosinate ammonium	400 g/L + 16 g/L SN	Monsanto
Roundup Original/Transorb	glyphosate	356-360 g/L SN	Monsanto
Rustler	glyphosate + dicamba	132 g/L + 60 g/L SN	Monsanto
Select	clethodim	240 g/L EC	Aventis CropScience
Sencor	metribuzin	75% DF, 75% DG, 500 g/L F	Bayer
Simazine	simazine	80% WP, 474 g/L F	UAP
Stampede EDF	propanil	80% DF	Rohm & Haas
Sundance	sulfosulfuron	75% DG	Monsanto
Target	dicamba + mecoprop + MCPA A	62.5 g/L + 62.5 g/L + 275 g/L SN	Syngenta
Thumper	bromoxynil + 2,4-D E	280 g/L + 280 g/L EC	Aventis CropScience
Tordon 22K	picloram	240 g/L SN	Dow AgroSciences
Touchdown 480/XP	glyphosate	330 g/L SN, 440 g/L SN	Syngenta
Treflan	trifluralin	480 g/L EC, 5% G	Dow AgroSciences
Triumph Plus	fenoxaprop-p-ethyl + MCPA E + thifensulfuron methyl	56 g/L EC + 256 g/L EC + 75% DF	Aventis CropScience
Tropotox Plus	MCPB + MCPA A	400 g/L SN	Nufarm
Turboprop	dichlorprop + 2,4-D E	300 g/L + 282 g/L EC	UAP
Unity	bromoxynil + triasulfuron	280 g/L EC + 75% WG	Aventis CropScience
Vantage/Vantage Plus	glyphosate	356-360 g/L SN	Dow AgroSciences
Velpar DF	hexazinone	75% DF	DuPont
Venture DG/Venture L	fluazifop-p-butyl	25% DG, 125 g/L EC	Syngenta
Victor	glyphosate	356 g/L SN	Inter Ag/Aventis CropScience

Abbreviations

WP	wettable powder	EC	emulsifiable concentrate	WSP	water soluble powder	SN	solution	A	amine
DG	water dispersible granule	G	granule	DF	dry flowable	F	flowable	E	ester
WSG	water soluble granule								

Products Available as Prepackaged Tank Mixes

Product Name (Manufacturer)	Component 1 or A	Component 2 or B	Component 3 or C	Crops	Weeds Controlled	Area Treated	Cost per acre
Achieve Extra Gold (Syngenta)	Achieve 40DG	Buctril M	Turbocharge (adjuvant)	Wheat (spring, durum, winter), barley, rye (fall & spring), forage grasses	See the weeds of the component products plus tame buckwheat	20 acres or 8 ha	$21.90
Champion Extra (DuPont Canada Inc.)	Refine Extra	Puma Super		Barley	See component products	40 acres or 16 ha	$20.95
Eclipse (Dow AgroSciences)	Lontrel (Eclipse A)	Vantage (Eclipse B)		Glyphosate tolerant/ Roundup Ready Canola varieties	See component products	30 acres	$15.90
FlaxMax Ultra (BASF)	Curtail F[1]	Poast Ultra	Merge (adjuvant)	Flax	See component products	18-23 acres or 7.2-9.3 ha	$18.64 to $25.17
Harmony Total (DuPont Canada Inc.)	Refine Extra	Horizon	Score (adjuvant)	Spring wheat (including durum)	Weeds controlled by Refine Extra plus wild oat, green foxtail	40 acres or 16 ha	$20.75
Horizon BTM (Syngenta)	Buctril M	Horizon	Score (adjuvant)	Spring wheat (including durum)	Weeds controlled by Buctril M plus wild oat.	20 acres or 8 ha	$21.24
Muster Gold/ MusterGold II (DuPont Canada Inc.)	Muster	Assure/ Assure II	Sure-Mix or Merge (adjuvant)	Canola, including herbicide tolerant canola	See component products	20 acres or 8 ha	$19.95
Pea Pack (Bayer)	Sencor	MCPA sodium salt		Pea	Lamb's-quarters, stinkweed, wild mustard, redroot pigweed, volunteer canola (non TTC)	40 acres or 16 ha	$5.95
Prevail (Dow AgroSciences)	Achieve 80DG	Curtail M	Turbocharge (adjuvant)	Spring wheat (including durum), barley	Grasses - Wild oat, green foxtail, persian darnel Broadleaves - weeds controlled by Curtail M, plus common groundsel, Russian thistle	20 acres or 8 ha	$24.90
Pursuit Ultra (BASF)	Poast Ultra	Pursuit	Merge (adjuvant)	Field pea, CLEARFIELD canola varieties	See Poast Ultra plus Pursuit tank mix	40 acres or 16 ha	$24.35

[1] *Not recommended for use on flax by itself.*

Note: *See the component products listed for information concerning staging, application information, safety precautions, the effect of weather and grazing, recropping, harvest interval and storage precautions. The more stringent recommendation of the two products should be followed. Mix products in the order listed.*

Herbicide Directory

2,4-D

Herbicide Group – 4
(Refer to page 20)

Company:

Various. Application details may differ with different product labels. Consult specific product labels for more information.

Formulations:

500 g/L or 600 g/L 2,4-D amine formulated as a solution; 600 g/L, or 700 g/L 2,4-DLV ester formulated as an emulsifiable concentrate.

Container sizes - various.

Crops:

Wheat, barley, spring and fall rye, winter wheat, field corn, established grass pastures, turf, fall stubble, seedling and established forage grasses (not for seed, amine formulations only).

Note: Not all 2,4-D products are registered for use on forage grasses; any such use of non-registered products is entirely at the risk of the user.

Weeds:

Susceptible weeds controlled in cereals include:

Bluebur
Cocklebur
Flixweed[2]
Kochia
Lamb's-quarters
Mustards including all varieties of volunteer canola
Narrow-leaved hawk's beard[2]
Prickly lettuce
Ragweed
Russian pigweed
Shepherd's purse[2]
Stinkweed[2]

Harder to kill weeds in cereals include:

Blue lettuce[1]
Canada thistle[1]
Common peppergrass
Curled dock
Dandelions[2]
Dog mustard
Leafy spurge[1]
Prostrate pigweed
Redroot pigweed
Russian thistle
Sow thistle[1]

[1] Top growth control only.
[2] Spring seedlings.

Crop Stage:

CROP	STAGE
Wheat, barley, Spring rye	4 leaf to early flag leaf
Fall rye, winter wheat	In spring, apply after the crop starts to grow but before the flag leaf stage. Winter wheat only may be treated in the fall for winter annual weed control (caution: this use not registered and is at the risk of the user).
Corn	Apply as an overall spray before corn is 6 inches (15 cm) tall and before the 6 leaf stage. After 6 inches (15 cm) use a directed spray.
Established grass pastures	No restrictions, apply when weeds are actively growing. For control of brush species, apply at time of rapid growth (usually May to mid-June, and September).
Turf	Apply in spring and early September on established turf. Do not use on bent grasses.
Fall stubble	Canada thistle (suppression only) - Apply when thistle plants are actively growing and have 6 to 8 inches (15 to 20 cm) of new growth. Regrowth will be present the following spring and in-crop treatments will be required. Winter Annuals - Apply in late fall when in the rosette stage.
Seedling and established forage grasses (not for seed)	Apply at the 3 leaf to shot blade stage of seedling grasses. Apply in spring up to the shot blade stage of established grasses, or in the fall after harvest.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

2 to 4 leaf stage.

Canada thistle (fall stubble) when plants are actively growing and have 6 to 8 inches (15 to 20 cm) of new growth.

Winter annual weeds - apply in late fall when in the rosette stage.

Cost:

Amine 500 g/L - $4.60-$5.25 per L
Amine 600 g/L - $6.15-$6.70 per L
LV Ester 600 g/L - $6.80 per L
LV Ester 700 g/L - $7.40-$8.90 per L
(2000 suggested retail prices)

Rates:

The following rates are for 500 g/L formulations of 2,4-D unless otherwise specified. To convert rates to 600 g/L formulation multiply by 0.83. To convert to 700 g/L formulations multiply by 0.71.

Spring wheat, barley, and rye - For susceptible weeds, apply 0.28 to 0.45 L/acre. For harder to kill weeds, apply 0.51 L/acre to 0.71 L/acre. **Caution** - these higher rates for harder to kill weeds may cause crop injury.

Winter wheat, fall rye - For susceptible weeds, apply 0.28 to 0.40 L/acre. For harder to kill weeds, apply 0.40 L/acre. **Caution** - rates above 0.40 L/acre may cause crop injury.

Corn - 0.28 to 0.45 L/acre.

Pastures - 0.57 to 1.82 L/acre.

Seedling forage grasses - Apply up to 0.45 L/acre of 2,4-D amine.

Established forage grasses - Apply up to 0.90 L/acre of 2,4-D amine or 0.78 L/acre of 2,4-D Ester 600 (600 g/L formulations) or 0.67 L/acre of 2,4-D Ester 700 (700 g/L formulations).

Fall stubble (Canada thistle, suppression only) - 0.91 L/acre.

Fall stubble (winter annuals prior to freeze up) - 0.28 to 0.45 L/acre.

Formulation Characteristics:

Formulation	Risk of Vapour Drift	Activity on Weeds	Risk of Crop Injury
LV Ester	Medium	Fast	Medium
Amine	Very Low	Medium	Low

Water Volume:

10 gallons/acre (45 L/acre) - ground application.

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

How it Works:

2,4-D is a systemic herbicide that is absorbed through foliage and roots and is translocated to actively growing areas within the plant. Symptoms include bending and twisting of leaves and stems within 2 to 7 days, followed by browning and plant death 3 to 4 weeks after application.

Effects of Growing Conditions:

Best weed control occurs when temperatures are above 21°C and humidity is above 70 percent. Do not apply if temperature exceeds 27°C.

Herbicide Tank Mixes:

Crop	2,4-D Amine	2,4-D Ester
Spring Wheat	Accord, Ally, Banvel II, Everest, Express, Horizon, Lontrel, Pardner, Refine Extra, Sencor, Stampede EDF.	Accord, Achieve, Ally, Assert, Avenge, Express, Lontrel, Pardner, Puma^{120} Super, Refine Extra, Assert + Refine Extra, Stampede EDF, Sundance.
Winter wheat	Banvel II, Express, Lontrel, Pardner, Refine Extra, Sencor.	Achieve, Assert, Avenge, Express, Lontrel, Pardner, Refine Extra, Assert + Refine Extra.
Barley	Ally, Banvel II, Express, Lontrel, Pardner, Refine Extra, Sencor.	Achieve, Assert, Ally, Avenge, Express, Lontrel, Pardner, Refine Extra, Assert + Refine Extra.
Summer fallow	Glyphosate	

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: 2,4-D amine - within 4 hours will reduce control.

2,4-DLV ester - within 2 hours will reduce control.

Grazing: Do not permit lactating dairy animals to graze fields within 7 days of application. Do not harvest forage or cut for hay within 30 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Recropping: No restrictions the year after treatment.

Aerial Application: Some formulations may be applied by air. Check the label for detailed instructions.

Storage: 2,4-D LV ester may be frozen. 2,4-D amine requires heated storage.

Tank Cleaning:

When finished spraying 2,4-D, run clean water through the tank, pump and lines. Drain. Refill sprayer with clean water and 1 L of household ammonia per 100 L of water. Circulate the solution through lines and nozzles. Flush sprayer system with water until thoroughly clean. Remove and clean nozzles and screens.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison

2,4-DB

Herbicide Group – 4
(Refer to page 20)

Company/Products:

Interprovincial Co-op (Cobutox 600)
Nufarm (Embutox 625)
United Agri Products (Caliber 400)

Formulations:

Cobutox 600 - 600 g/L 2,4-DB formulated as an emulsifiable concentrate.
Container size - 10 L.

Embutox 625 - 625 g/L 2,4-DB formulated as an emulsifiable concentrate.
Container size - 10 L.

Caliber 400 - 400 g/L 2,4-DB formulated as an emulsifiable concentrate.
Container size - 10 L.

Crops:

Seedling stands of alfalfa, bird's-foot trefoil, and white Dutch clover. May be used on these forage legumes sown alone or with wheat, barley or oats as a cover crop. May be used on pastures.

Embutox and Calibre only: Seedling timothy, smooth bromegrass, orchard grass, fescue (creeping red, meadow, tall), wheatgrass (crested, intermediate, streambank, tall).

Weeds:

Weeds controlled at lower recommended rates include:

Ball mustard
Lamb's-quarters
Ragweed
Redroot pigweed
Shepherd's-purse
Stinkweed
Wild mustard
Wormseed mustard

Weeds controlled at higher recommended rates include:

Bull thistle[1]
Canada thistle[1]
Chicory
Curled dock[2]
Dandelion[1]
Field bindweed
Green smartweed[2]
Horsetail[1]
Narrow-leaved hawk's beard
Oak-leaved goosefoot
Perennial sow-thistle[1]
Lady's-thumb[2]
Plantain
Wild buckwheat
Yellow rocket

[1] top growth control
[2] suppression

Refer to individual product labels for details on application rates to use for different weed species.

Crop Stage:

Cereals between the 5 leaf and flag leaf stage.

Forage legumes must be between the 1 and 3 trifoliate leaf stage.

Pastures containing forage legumes - apply after cutting or grazing when growth is not more than 3 inches (7.5 cm) in height.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

2 to 4 leaf stage of annual weeds. 2 to 4 leaf stage for narrow-leaved hawk's beard control, apply in the fall after legume growth ceases.

Perennial sow-thistle, bull thistle - rosette stage.

Canada thistle - 15 cm (6 inches) to early bud stage.

Plantain - spray before flowering.

Yellow rocket - third week of September to the middle of October.

Horsetail - 10 to 13 cm (4 to 5 inches) in height.

Dandelion - before bud stage.

Cost:

$13.05 to $16.75/acre (2000 suggested retail price).

Rates:

When applying to seedling forage legumes:

HERBICIDE	RATE (L/ACRE)	ACRES TREATED PER CONTAINER
Cobutox 600	0.73 - 0.93	13.7 - 10.8
Embutox 625	0.71 - 0.91	14.1 - 11.0
Caliber 400	1.1 - 1.4	9.0 - 7.0

When applying to pastures containing forage legumes:

HERBICIDE	RATE (L/ACRE)	ACRES TREATED PER CONTAINER
Cobutox 600	0.73 - 1.13	13.7 - 8.8
Embutox 625	0.71 - 1.11	14.1 - 9.0
Caliber 400	1.11 - 1.72	9.0 - 5.8

Water Volume:

15 to 20 gallons/acre (70 to 90 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

How it Works:

2,4-DB is a systemic herbicide that is absorbed through foliage and roots and is translocated to actively growing areas within the plant. Symptoms include bending and twisting of leaves and stems within 2 to 7 days, followed by browning and plant death 3 to 4 weeks after application.

Effects of Growing Conditions:

Severe damage to legumes can occur if high temperatures (more than 27°C) or high humidity prevail at the time of application.

Do not apply under dry soil/drought conditions.

Tank Mixes:

Herbicides: To improve control of wild mustard beyond the 4 leaf stage, Cobutox at the reduced rate of 0.53 L/acre, or Caliber 400 at 0.81 L/acre, may be tank mixed with MCPA amine (500 g/L) at 0.028 L/acre. Embutox 625 at 0.51 L/acre may be tank mixed with MCPA sodium salt (300 g/L) at 0.047 L/acre. This tank mix may increase crop damage (stunting). Follow all precautions and restrictions on both product labels. May be tank mixed with Venture for use in alfalfa.

Embutox 625 and Cobutox may be tank mixed with Avenge in barley and certain wheat varieties. See Avenge label for wheat restrictions.

Fertilizers: None.

Insecticides: None.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour will reduce control.

Grazing: Do not graze or cut for feed for 30 days after applying Embutox. Do not graze treated crop or cut for feed in year of treatment after using Cobutox or Caliber.

Recropping: No restrictions the year after application.

Aerial Application: No restriction on label. Reduced water volumes used with aerial applications will lead to increased injury to forage legumes.

Storage: Do not freeze Caliber 400.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Non-labelled broadleaf crops may be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Danger Poison (Cobutox 600)

Caution Poison (Embutox 625)

Warning Poison (Caliber 400)

Accent*

Herbicide Group – 2
(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

75 percent nicosulfuron formulated as a water dispersible granule.

Container size - 133.6 g (4 x 33.4 g water soluble bags).

Crops:*

Field Corn

*Since this product is registered under minor use application, the manufacturer assumes no responsibility for herbicide performance.

Crop Stage:

1-8 leaf stage (six visible collars), coleoptile (short, blunt leaf) is counted as the first leaf.

Weeds Controlled and Staging:

1-6 leaves (up to 2 tillers)	Barnyard grass, fall panicum, green foxtail, yellow foxtail[1], old witchgrass
3-6 leaves (4-8 inches (10 to 20 cm) with leaf extended)	Quackgrass
3-6 leaves	Wild oats

[1]suppression only

Cost:

$23.14 per acre. (2000 suggested retail price)

Rates:

Apply Accent at 13.5 g/acre. Add non-ionic surfactant (Cittowet Plus, Agsurf or Agral 90) at 0.2 L per 100 L of spray solution.

One bag of Accent will treat 10 acres (4 ha).

One container will treat 40 acres (16 ha).

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

Minimum 10 gal/acre (45 L/acre); optimum 12.5 to 17 gal/acre (57 to 77 L/acre)

Pressure:

175 to 275 kPa (25 to 40 psi).

Nozzles:

Flat fan nozzles tilted forward at a 45° angle. Screens of 50 mesh or larger are recommended.

How it Works:

Accent is a systemic herbicide that is absorbed through the foliage and translocated to the growing points of the plant. Growth of affected plants will stop shortly after application. Symptoms include discolouration (yellowing, purpling, and reddening) of the newest leaves and are visible within 1 to 3 weeks. Eventually the entire plant discolours and dies.

Effects of Growing Conditions:

Poor weed control or crop injury may result if at the time of application, plants are under stress from disease, insect or nematode injury, carryover of herbicide from a previous years application, abnormally hot or cold weather, drought, water-soaked soils, hail damage or frost. Delay application until stress passes and both corn and weeds have resumed growth. When corn is injured by frost, wait 48-72 hours after normal growing conditions have resumed before applying Accent. Stress conditions after application may also result in injury or poor weed control.

Tank Mixes:

Herbicides: None registered.

Fertilizers: Do not mix with fertilizers.

Insecticides: None registered. Accent should not be applied to corn that has been treated with Counter, Cygard, Thimet, or Di-Syston. Application of Accent to corn treated with Dyfonate may result in temporary yellowing or stunting of crop. Leave seven days between the application of Accent and that of a foliar organophosphorous insecticide.

Restrictions:

Rainfall: Within 2-4 hours of application may result in reduced weed control.

Grazing: Do not graze treated crops or cut for hay.

Preharvest Interval: Do not apply within 30 days of harvest.

Recropping: Corn and spring cereals may be seeded the year following Accent application. For all other crops, a field bioassay is recommended before planting.

Aerial Application: Do not apply by air.

Storage: Store product in original containers in a secure, dry area, away from other pesticides, food or feed.

Buffers: Leave a 5 m buffer between the last spray path and woodlots or shelterbelts. Leave a 22 m buffer before wetland areas or water bodies.

Tank Cleaning:

Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill the tank with water while adding 1 litre of household ammonia (minimum 3 percent ammonia) for every 100 L of water. Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes. Again flush hoses, boom and nozzles with the cleaning solution, then drain the tank. Remove and clean the nozzles and screens separately in a bucket containing a 1 percent solution of ammonia in water. If the spray equipment is to be used to spray crops other than corn, repeat the above process and thoroughly wash the spray mixture from the outside of the spray tank and the boom. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer again, flush the tank, boom and hoses for 5 minutes with fresh water.

Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

Hazard Rating:

KEEP OUT OF REACH OF CHILDREN.

Caution Eye Irritant

Avoid breathing spray mist.

Avoid contact with skin, eyes and clothing.

Accord

Herbicide Group – 4
(Refer to page 20)

Company:

BASF

Formulation:

75 percent quinclorac formulated as a dry flowable. Container size - 2 x 1.1 kg bags of Accord and 2 x 8.1 L jugs of Merge.

Crops:

Spring wheat (including durum), canaryseed*, feed barley** (not for use on malting barley).

* Not to be used for human consumption or livestock feed.

** At the time of publishing, a restriction on barley treated with Accord from entering the USA is in place. Check with BASF and your potential buyers before using Accord on barley destined for the USA.

Crop Stage:

Wheat - 1 to 5 leaf.

Barley - 1 to 4 leaf (prior to tillering)

Canaryseed - 3 to 5 leaf

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds Controlled and Staging:

Barnyard grass - 1 to 5 leaf.

Cleavers - 1 to 3 whorls.

Green foxtail - 1 to 5 leaf, maximum 2 tillers.

Volunteer flax - 1 to 8 cm (0.5 to 3 inches).

Sow-thistle (supression of annual and perennial seedling and established plants in the 2-6 leaf stage).

Early treatment of weeds is important to maximize crop yield potential by eliminating early weed competition. Refer to page or label of broadleaf tank mix partner for additional timing restrictions.

Cost:

$8.65 to $10.48/acre (2000 suggested retail price).

Rate:

0.054 to 0.068 kg/acre (40 to 33 acres/case). Apply with Merge at 1 L per 100 L of spray solution. Use the high rate for heavy infestations of green foxtail. Guidelines for weed densities at light or heavy infestations are not provided on the product label. When in doubt as to the infestation level, use the high rate or contact your local BASF technical representative.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Standard flat fan nozzles tilted forward 45 degrees. Use 50 mesh strainers and screens.

How it Works:

Accord is a systemic, growth regulator type herbicide that is absorbed primarily through the foliage, but also through the roots of plants. New leaves of susceptible grassy weeds become chlorotic (yellowed) within 1 to 2 weeks of application and eventually turn brown, resulting in plant death 2 to 4 weeks after application. Accord causes epinasty (bending and twisting) in broadleaf weeds 1 to 2 weeks after application, with plant death occurring 2 to 4 weeks after application.

Effects of Growing Conditions:

Do not apply to crop that is under stress from conditions such as frost, hail, flooding, drought or extremes in temperature.

Tank Mixes:

Herbicides: Accord may be mixed with the following herbicides. When mixing with broadleaf partners a slight reduction in green foxtail control may result. If spraying for green foxtail, use the high rate of Accord.

Buctril M (0.40 L/acre)

2,4-D amine or ester - 500 g/L formulations (0.34 to 0.45 L/acre)

MCPA amine or ester - 500 g/L formulations (0.34 to 0.45 L/acre)

Refine Extra (0.008 kg/acre)

Express Pack (0.004 kg/acre Express + 0.253 L/acre 2,4-D ester)

Avenge 200 C (1.42 L/acre) - Apply to spring wheat varieties listed on Avenge 200C label only. The Accord/Avenge 200 C tank mix can also be mixed with Buctril M, 2,4-D ester, MCPA ester or Refine Extra at the rates listed above.

To improve green foxtail control use the high rate of Accord. Add Merge at 1 L per 100 L spray solution for all tank mixes. Refer to individual product labels for application details such as staging and varietal restrictions.

Fertilizers: None registered.

Insecticides: None registered.

Allow 4 days between the application of Accord and any other chemical not listed as a tank mix.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours may reduce control.

Grazing: Do not graze or cut for feed within 77 days of application.

Preharvest: Do not apply within 77 days of harvest.

Recropping: Wheat, barley, canola, field peas and sunflowers may be grown the year after application. Flax and lentils may be grown the second year after an Accord application. On low organic matter soils or under dry conditions, flax and lentils should not be grown until the third year after application. Do not use Accord on land where potatoes or vegetables are grown. In case of crop failure, only spring wheat (including durum) may be reseeded the same year as an Accord application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

Aerial Application: Do not apply by air.

Storage: May be frozen. Should product freeze, warm to room temperature before using.

Tank Cleaning:

Completely fill spray tank with clean water while adding 1 L of household ammonia (containing 3 percent ammonia) per 100 L of water or a commercially licensed tank cleaner such as Finnish. Flush the solution through the boom and nozzles and then add more water to completely refill the tank. Agitate the solution for at least 15 minutes and then flush the boom and nozzles until the spray tank is empty.

Hazard Rating:

Caution Poison

Caution Eye and Skin Irritant

Achieve 80 DG

Herbicide Group – 1
(Refer to page 20)

Company:

Syngenta

Formulation:

Achieve 80 DG – 80 percent tralkoxydim formulated as a dispersible grain. Container size - 2 x 2 kg plus 8 L of Turbocharge adjuvant.

Crops:

Cereal crops:
Spring wheat (including durum), winter wheat, barley, triticale, rye (spring and fall)

Grasses for seed production only (seedling or established):
Intermediate wheatgrass
Crested wheatgrass
Creeping red fescue
Meadow bromegrass
Smooth bromegrass
Timothy (seedling only)

Grasses for forage production (seedling year only, do not graze in the year of treatment):
Northern wheatgrass
Western wheatgrass
Slender wheatgrass

Grasses for forage or seed production (established only):
Timothy

May be used on wheat and barley crops undersown to forage legumes (if not tank mixed with a broadleaf herbicide).

Do NOT apply Timothy sown with a cover crop.

Crop Stage:

Timothy - 5 to 6 leaf stage. Applications before this stage will result in crop injury and reduction in forage yield.

Other crops - No restrictions in terms of leaf staging.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Wild oats - 1 to 6 leaf stage (total leaves including tillers), with a maximum of 2 tillers.

Volunteer tame oats - 1 to 6 leaf stage.

Green foxtail - 1 to 5 leaf stage (total leaves including tillers), with a maximum of 1 tiller.

Persian darnel, barnyard grass - 1 to 4 leaf stage (total leaves including tillers).

Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

Cost:

$15.75/acre (2000 suggested retail price).

Rates:

Achieve 80 DG – 0.10 kg/acre. (One case treats 40 acres). Add Turbocharge at a rate of 0.5 L per 100 L spray solution.

Add ammonium sulfate at 7.5 to 15 lb/100 gallons water (0.75 to 1.5 kg/100 L water) when water analysis shows bicarbonate levels are 400 ppm or greater.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

5 to 10 gallons/acre (23 to 45 L/acre). Use 10 gallons/acre (45 L/acre) when applying to timothy. Do not apply with air assist sprayers set to apply less than 5 gallons/acre (23 L/acre) water volume as mixing problems or unacceptable crop injury could occur.

Pressure:

275 kPa (40 psi).

Nozzles:

80° or 110° flat fan nozzles. All strainer and nozzle screens must be 50 mesh or coarser.

How it Works:

Achieve is a systemic herbicide that is absorbed through leaves and translocated to growing points within plants. Early symptoms appear in 3 to 7 days as chlorosis (yellowing) on the newest leaves, which spreads to older leaves, leading to browning and plant death 2 to 3 weeks after application.

Effects of Growing Conditions:

Cereal crops that have set tillers may incur injury (yellowing and/or stunting) if applications are made within 48 hours of freezing temperatures. Cereal crops that have not set tillers may be injured if exposed to temperatures of 4°C or less up to 48 hours before or after application. Tank mixing with a broadleaf weed herbicide under adverse conditions may increase severity of crop injury. Crops under stress from foliar diseases or low fertility are more susceptible to injury from application. Temporary crop injury may occur when Achieve tank mixes (particularly Estaprop, Turboprop, Dichlorprop D, and Buctril M + MCPA) are applied under extreme environmental conditions (dry or wet, cool or hot weather) resulting in crop stress. Control of grasses could be reduced when they are stressed due to drought, heat, lack of fertility, flooding or prolonged cool temperatures.

Tank Mixes:

Herbicides: In wheat and barley, Achieve may be tank mixed with:

2,4-DB (0.81 L/acre - 600 g/L formulations)
2,4-D ester (0.45 L/acre - 500 g/L formulations)
Attain (40 acres per case)
Buctril M (0.40 L/acre)
Curtail M (0.80 L/acre)
Dichlorprop + 2,4-D (0.71 L/acre)
Lontrel + MCPA ester (0.20 L/acre + 0.45 L/acre - 500 g/L formulations)
MCPA ester (0.45 L/acre - 500 g/L formulations)
Pardner (0.40 L/acre)
Prestige (20 acres per case)
Thumper (0.40 L/acre)

For all tank mixes with Achieve, add Turbocharge at a rate of 0.5 L per 100 L of spray solution.

Tank mixes with Buctril M, Thumper, or Pardner may result in some temporary initial injury in the form of tip burn.

Temporary crop injury and a reduction in wild oat control may occur with the Attain tank mix.

In forage grasses, do NOT tank mix Achieve with a broadleaf herbicide.

When applying broadleaf herbicides not listed above, in the same field, always apply Achieve first. Apply the broadleaf product no sooner than seven days after application of Achieve.

Fertilizers: None registered.

Insecticides: Achieve, Achieve + Buctril M, and Achieve + Pardner may be mixed with Decis Flowable at 0.049 L/acre.

Fungicides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour will reduce control.

Grazing: Timothy and treated cereal crops must not be grazed or cut for feed within 16 days of treatment. Straw from treated crops may be fed to livestock.

Treated forage grasses grown for seed production must not be grazed or cut for feed.

Do not graze treated forage crops in the year of treatment (except timothy).

Preharvest: Do not apply within 60 days of harvest.

Recropping: None.

Aerial Application: Achieve may be applied by air in 2.5 to 4 gallons/acre (11 to 18 L/acre). Do not apply within 50 m of fish bearing waters and wildlife habitat.

Storage: May be frozen.

Environment: Do not apply within 15 m of fish bearing waters and wildlife habitat.

Tank Cleaning:

When spraying is complete, thoroughly rinse the tank with clean water to remove any residues. Use of a detergent or Agral 90, Agsurf will enhance removal of any residues in the tank.

Hazard Rating:

Caution Poison

Caution Eye Irritant

Achieve Extra Gold

Herbicide Group – 1,4,6
(Refer to page 20)

Company:

Syngenta

Formulation:

Achieve Extra Gold contains 3 components.

Achieve 40 DG - 40 percent tralkoxydim formulated as a dispersible granule. Container size - 4 kg.

Buctril M - 280 g/L bromoxynil and 280 g/L MCPA ester formulated as an emulsifiable concentrate. Container size - 8 L.

Turbocharge adjuvant. Container size - 4 L.

Crops and Staging:

Spring wheat (including durum), barley - 2 leaf to early flag leaf stage.

Winter wheat, rye (spring and fall) - from the time growth commences in the spring to the early flag leaf stage.

Weeds and Staging:

Grassy weeds controlled include:

Wild oats - 1 to 6 leaf stage (total leaves including tillers with a maximum of 2 tillers)

Barnyard grass, Persian darnel - 1 to 4 leaf stage (total leaves including tillers)

Green foxtail, yellow foxtail - 1 to 5 leaf stage (total leaves including tillers with a maximum of 1 tiller)

Volunteer tame oats - 1 to 6 leaf stage.

Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are controlled before tillering.

Broadleaf weeds controlled include:

Up to the 4 leaf stage:

American nightshade
Ball mustard
Bluebur
Cocklebur
Cow cockle
Flixweed
Green smartweed
Kochia[1]
Lady's-thumb
Night-flowering catchfly
Pale smartweed
Redroot pigweed
Russian thistle[1]
Scentless chamomile (spring annuals only)
Shepherd's-purse
Velvetleaf[2]
Volunteer canola
Volunteer sunflower

Up to the 6 leaf stage:

Wild tomato

Up to the 8 leaf stage:

Common groundsel
Common ragweed
Lamb's-quarters
Stinkweed
Tartary buckwheat
Volunteer tame buckwheat
Wild buckwheat
Wild mustard
Wormseed mustard

Perennials (top growth control):

Canada thistle
Perennial sow-thistle

[1] Spray before plants are 2 inches (5 cm) in height.
[2] Spray before plants are 3 inches (8 cm) in height.

Cost:

$21.90/acre (2000 suggested retail price).

Rates:

One case treats 20 acres. Add Turbocharge at a rate of 0.5 L per 100 L spray solution.

Add ammonium sulfate at 7.5 to 15 lb/100 gallons water (0.75 to 1.5 kg/100 L water) when water analysis shows bicarbonate levels are 400 ppm or greater.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

5 to 10 gallons/acre (23 to 45 L/acre). Do not apply with air assist sprayers set to apply less than 5 gallons/acre (23 L/acre) water volume as mixing problems or unacceptable crop injury could occur.

Pressure:

275 kPa (40 psi).

Nozzles:

80° or 110° degree flat fan nozzles. All strainer and nozzles screens must be 50 mesh or coarser.

How it Works:

Achieve is a systemic herbicide that is absorbed through leaves and translocated to growing points within plants. Early symptoms on grassy weeds appear in 3 to 7 days as chlorosis (yellowing) on the newest leaves, which spreads to older leaves, leading to browning and plant death 2 to 3 weeks after application. Buctril M contains two components, bromoxynil and MCPA ester. Bromoxynil is a contact herbicide causing yellowing on susceptible weeds within 1 or 2 days and browning 3 to 6 days after application. MCPA ester is a systemic herbicide that is absorbed through foliage and roots and is translocated to actively growing areas within the plant. Symptoms include bending and twisting of leaves and stems within 2 to 7 days, followed by browning and plant death 3 to 4 weeks after application.

Effects of Growing Conditions:

Cereal crops that have set tillers may incur injury (yellowing and/or stunting) if applications are made within 48 hours of freezing temperatures. Cereal crops that have not set tillers may be injured if exposed to temperatures of 4°C or less up to 48 hours before or after application. Tank mixing with a broadleaf weed herbicide under adverse conditions may increase severity of crop injury. Crops under stress from foliar diseases or low fertility are more susceptible to injury from application. Temporary crop injury may occur when Achieve Extra Gold is applied under extreme environmental conditions (dry or wet, cool or hot weather) resulting in crop stress. Control of grasses could be reduced when they are stressed due to drought, heat, lack of fertility, flooding or prolonged cool temperatures.

Tank Mixes:

Herbicides: May be tank mixed with 0.22 L/acre MCPA ester (500 g/L formulations). A reduction in green foxtail control may occur with this tank mix.

Fertilizers: None registered.

Insecticides: May be tank mixed with 0.049 L/acre Decis Flowable.

Fungicides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour will reduce control.

Grazing: Do not graze treated crops or cut for feed within 30 days of application.

Preharvest: Do not apply within 60 days of harvest.

Recropping: No restrictions.

Aerial application: Achieve Extra Gold may be applied by air in 2.5 to 4 gallons/acre (11 to 18 L/acre) water.

Storage: May be frozen.

Environment: Do not apply within 15 m of fish bearing waters and wildlife habitat.

Tank Cleaning:

When spraying is complete, thoroughly rinse the tank with clean water to remove any residues. Use of a detergent or Agral 90, Agsurf will enhance removal of any residues in the tank.

Hazard Rating:

Caution Poison, Caution Eye Irritant (Achieve 40 DG)

Warning Poison (Buctril M)

Ally Toss-N-Go

Herbicide Group – 2
(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

60 percent metsulfuron methyl formulated as a dry flowable.

Container size - 122 g (4 x 30.5 g water soluble bags).

Crops:

Wheat (spring and durum), barley, seedling or established creeping red fescue for seed*, orchard grass*, crested wheatgrass* and intermediate wheatgrass (for forage or seed production*).

* Since applications in these crops have been registered under minor use application, the manufacturer assumes no responsibility for herbicide performance.

Weeds:

Weeds Controlled:

- Ball Mustard
- Bluebur
- Chickweed
- Common groundsel
- Corn spurry
- Cow cockle
- Flixweed
- Green smartweed
- Hemp-nettle
- Kochia
- Lady's-thumb
- Prostrate pigweed
- Redroot pigweed
- Scentless chamomile
- Shepherd's-purse
- Stinkweed
- Stork's-bill
- Tartary buckwheat
- Volunteer canola[1]
- Wild mustard

[1] CLEARFIELD canola varieties will be controlled only with the addition of 2,4-D or MCPA.

Weeds Suppressed:

- Canada thistle
- Lamb's-quarters
- Russian thistle
- Sow-thistle (annual and perennial)
- Toadflax
- Wild buckwheat

Caution:

Ally residues can persist for long periods, potentially limiting recropping options. Degradation of Ally is dependent on the pH, moisture, and temperature of the soil. Refer to the label for details on rotation and minimum recropping intervals.

Crop Stage:

Wheat, barley - 2 leaf to flag leaf stage.

Forage grasses - 2 leaf to flag leaf. Apply before canopy is dense enough to prevent thorough leaf coverage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

2 to 4 leaf stage. Wild buckwheat must be sprayed in the cotyledon to 3 leaf stage. For suppression of Canada thistle, apply when thistles are less than 6 inches (15 cm) tall.

Cost:

$3.58 to $5.33/acre (2000 suggested retail price).

Rates:

Apply 2 to 3 g/acre. Add Agral 90, Agsurf, Companion, Super Spreader Sticker or Citowett Plus at 0.2 L per 100 L spray volume. (One 122 g container of Ally treats 40 to 60 acres.)

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

200 to 275 kPa (35 to 40 psi).

Nozzles:

Flat fan nozzles. Use 50-mesh screens.

How it Works:

Ally is absorbed by leaves and roots, and rapidly stops growth of susceptible weeds. Discoloration will be visible in 1 to 3 weeks.

Effects of Growing Conditions:

Ally may injure crops stressed by heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/ night temperatures, drought, or water-saturated soils, either before or after application. Weed control will be reduced under dry, cold conditions.

Tank Mixes:

Herbicides: Do not mix the soluble bags with any substance containing boron or which releases chlorine.

In wheat and barley, Ally can be tank mixed with:

2,4-D Amine or Ester (0.34 to 0.45 L/acre of 500 g/L formulation), plus surfactant.

Avenge (1.72 L/acre), no surfactant required.

Avenge + MCPA Ester, no surfactant required.

MCPA Amine or Ester (0.28 to 0.45 L/acre of 500 g/L formulation), plus surfactant.

Puma™ Super (0.154 to 0.308 L/acre)

In spring wheat (including durum):

Horizon (0.095 or 0.115 L/acre) plus Score adjuvant

Puma Super (0.202 or 0.405 L/acre) with no surfactant

Consult tank mix partner labels for additional crop staging and variety restrictions.

Fertilizer: None registered. Do not mix the soluble bags with fertilizers.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 4 hours of application of tank mixes with 2,4-D amine, 2 hours of application of tank mixes with 2,4-D ester, will reduce weed control.

Grazing: Do not graze for 24 hours after treatment.

Recropping: Refer to table below. The following recropping intervals, based on soil pH, should be considered as guidelines only. Ally residues may affect crops for a longer period of time than outlined in the following table. Add 12 months to recommendations if less than 5 inches (130 mm) of rainfall in brown and dark soils or less than 10 inches (250 mm) rainfall in black or grey wooded soils in any year following application.

Effects of Ally residues on crops other than those listed in the table have not been fully evaluated. Because of the length of recropping restrictions and the lack of information on many rotational crops, Ally is not recommended for use on farms where special crops are grown (such as fababeans, beans, sunflowers, buckwheat, corn, sugar beets, etc.).

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. May be frozen.

Tank Cleaning:

Ally can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Ally should be flushed out immediately after Ally is used. The manufacturer recommends that sprayers used to apply this product be flushed 2 times with a water/household ammonia rinse (1 L of 3 percent ammonia per 100 L water). All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Caution Eye Irritant

MINIMUM RECROPPING INTERVAL (MONTHS)

SOIL PH	BARLEY, WHEAT	OAT[1]	CANOLA[1]	FLAX[1]	LENTILS	CANARY-SEED	YELLOW MUSTARD
less than 7.0	10	10	10 (22)	10 (22)	34	48	48
7.0 - 7.9	10	10 (22)	22 (34)	34	48	48	48

[1] Figures in brackets refer to recropping intervals in brown and dark brown soil zones. ALL OTHER DATA refer to recropping intervals in all soil zones.

On black and grey wooded soils with pH of 7.5 or less, fescue may be planted 10 months after application and alfalfa, red clover, peas and flax may be planted 22 months after application. Do not use on soils with pH greater than 7.9.

Amitrol 240

Herbicide Group – 11
(Refer to page 20)

Company:

Nufarm

Formulation:

231 g/L amitrole formulated as a liquid. Container size - 10 L.

Crops:

Perennial weed control after harvest.

Non-selective patch treatment of perennial weeds in pastures and shelterbelts.

Prior to seeding:

- Barley
- Canola
- Field corn
- Field pea
- Soybeans
- Wheat
- White beans

Weeds:

Fall stubble: Canada thistle, sow-thistle.

Pastures, shelterbelts: non-selective control of Canada thistle, sow-thistle, dandelion, milkweed, toadflax, poison ivy, leafy spurge, hoary cress, horsetail.

Preseeding: dandelion and annual weeds.

Crop Stage:

Cereals, peas: After harvest in fall.

Shelterbelt: Use only in established shelterbelts. Direct spray away from tree foliage or trunks.

Pastures: Time applications according to weed stage.

Preseeding: Delay planting for 10 to 14 days after treatment for field corn, white beans and field peas; 6 days for soybeans; 7 days for canola, wheat, and barley.

Do not apply within 8 months of seeding other crops.

Weed Stage:

Fall stubble: Spray when thistle has 4 to 6 inches (10 to 15 cm) of new growth.

Do not cultivate for 2 weeks after application. Do not apply after October 1. Do not replant crops in treated areas within 8 months of application.

Pastures and Shelterbelts:

WEED	WEED STAGE
Canada thistle, perennial sow-thistle	Early bud to bloom stage
Dandelion	When plants are young and actively growing
Hoary cress	Advanced rosette or advanced bud
Leafy spurge	Advanced flowering to early seed set
Milkweed, horsetail, and poison ivy	When plants are young and actively growing
Toadflax	Advanced rosette to prebud

Do not mow treated plants for 3 weeks after application.

Preseeding (canola, field pea, wheat, barley, field corn, soybeans and white beans only): Dandelion should be actively growing and less than 10 cm tall or across. Do not cultivate for 10 to 14 days after treatment.

Cost:

$6.20/L (2000 suggested retail price).

Rates:

Preseeding dandelion control: 1.7 to 3.4 L/acre. Use the low rate only for canola, wheat, barley and field pea.

Non-crop weed control:

WEED	RATE (L/ACRE)
Canada thistle	5.0 to 6.7
Cattails	15.2 to 18.5
Dandelion	1.7 to 5.0
Hoary Cress	7.6 to 11.3
Horsetail	5.0 to 6.7
Leafy Spurge	15.2 to 18.5
Milkweed	7.6 to 11.3
Perennial sow-thistle	5.0 to 6.7
Poison Ivy	3.74
Toadflax	7.6 to 11.3

Avoid using rates higher than 6.6 L/acre for preplant applications on very light textured soils with low organic matter, as crop damage can occur.

For spot treatments in pasture and non-crop land, apply 0.165 L in 25 L of water to treat a 10 m x 10 m area. For patch treatment of leafy spurge and horsetail, apply 0.460 L in 25 L of water to treat a 10 m x 10 m area.

Water Volume:

Fall stubble: 10 to 20 gallons/acre (45 to 90 L/acre).

Pastures, shelterbelts: 10 to 30 gallons/acre (45 to 135 L/acre). For poison ivy, apply 50 to 100 gallons/acre (225 to 450 L/acre).

Preseeding: 10 to 20 gallons/acre (45 to 90 L/acre).

Pressure:

Less than 300 kPa (45 psi).

Nozzles:

Flat fan.

How it Works:

Amitrol 240 is a systemic herbicide which inhibits pigment production, including chlorophyll. Whitening begins in 7-14 days, followed by plant death.

Effects of Growing Conditions:

Less than acceptable results may occur in dry weather.

Tank Mixes:

Herbicides: Amitrol 240 may be tank mixed with Roundup for improved control of certain weeds, including dandelion. Tank mix 1.68 L/acre Amitrol 240 with 0.5 L/acre Roundup. Follow directions on the Amitrol 240 and Roundup labels for timing and use precautions.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crops or weeds or use for hay or feed.

Recropping: Residues may affect crops for 8 months following application.

Aerial Application: Do not apply by air.

Storage: Do not store where temperatures may exceed 50°C or near open flames. Do not store below 4°C.

Tank Cleaning:

Rinse all sprayer parts several times with clean water. Rinse immediately after use to prevent corrosion of metal parts.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Caution eye irritant

Avoid breathing spray mist or vapours. Do not re-enter treated areas within 12 hours.

Anthem

Herbicide Group – 2
(Refer to page 20)

Anthem (For use in the Brown & Dark Brown soils of Saskatchewan with less than 4 percent organic matter)

Company:

Monsanto Canada Inc.

Formulation:

75 percent sulfosulfuron formulated as a water dispersible granule. 432g per case.

700 g/L 2,4-D Ester formulated as an emulsifiable concentrate. Container size: 1 x 10.3 L.

Adjuvant: Merge- 8 L.

PH adjuster: 7% ammonium hydroxide solution.
Container size: 4L jug.

Crop:

Spring wheat (including Kyle and Plenty durum)
(Do not underseed forage legumes).

Weeds Controlled:

Grass:

- Foxtail barley
- Green foxtail[1]
- Quack grass[1]
- Wild oat.

Broadleaf:

- Annual smartweed spp.,
- Cleavers
- Common chickweed
- Dandelion[2]
- Kochia
- Lamb's-quarters
- Narrow-leaf hawk's-beard[3]
- Perennial sow-thistle[2]
- Redroot pigweed
- Stinkweed
- Stork's-bill
- Volunteer canola (including SMART varieties when tank mixed with 2,4-D)
- Wild buckwheat
- Wild mustard

[1] Suppression only
[2] Control of spring seedlings and season-long control of established plants.
[3] Spring Seedlings only

Crop Stage:

From the 4 leaf stage up to emergence of the 4th tiller.

Weed Stage:

Wild oat: From emergence to the 6 leaf stage with no more than 3 tillers. For optimum weed control and crop yield, apply prior to tillering.

Annual broadleaf weeds: Apply to the seedling stage for optimum weed control.

Perennial weeds: Prior to flowering when plants are actively growing.

Cost:

$18.50/acre (2000 suggested retail price including adjuvant).

Rates:

PH adjuster - add 1 L per 400 L of spray solution.
Anthem - 11 g/acre or 40 acres/case
2,4-D 700 ester - 0.243 L/acre or 40 acres/jug
Merge at 0.2 L/acre.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

5 to 10 gallons/acre (23 to 45 L/acre)

Pressure:

275 kPa (40 psi)

Nozzles:

Flat fan. Choose nozzles that provide optimum spray distribution and coverage at the appropriate spray pressure. Do not use flood jet or controlled droplet application equipment.

How it Works:

Anthem is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing points of the plant. Growth of susceptible weeds stops soon after application. Symptoms include discoloration (yellowing, reddening, purpling) of new leaves and are visible 1-3 weeks after application, depending on growing conditions and susceptibility of target plants.

2,4-D is a systemic herbicide that causes twisting and bending of plant parts within 2-7 days followed by discolouration and plant death 3-4 weeks after application.

Effects of Growing Conditions:

For optimum results, do not apply to weeds growing under stress.

Tank Mixes:

Herbicides: None

Fertilizers: None

Insecticides: None

Restrictions:

Rainfall: Do not apply if rain is forecast during, or soon after, application.

Grazing: Do not graze in the year of treatment.

Pre-harvest interval: No information available on label. Contact manufacturer for information.

Recropping: In fields with areas where organic matter content is less than 4 percent and with soil pH greater than 7.0 seed only wheat or CLEARFIELD canola the year following application. If necessary, re-seed only to wheat in the year of application. Wheat (including durum), canola, barley, peas and flax may be grown two years after application.

For all other crops, allow at least 22 months following application and conduct a field bioassay prior to planting.

Aerial Application: Do not apply by air.

Storage: Store under cool, dry conditions (below 50° C) away from foodstuffs, feed or seed.

Environment: Do not apply to water or contaminate water when draining sprayer. Maintain a buffer zone of 30 m between the last spray swath and the edge of sensitive areas (shelterbelts, woodlots, or gardens). Leave a buffer zone of 6 m between the last spray pass and wetlands or ponds. Use precautions to AVOID DRIFT. Drift may cause soil residues that will injure subsequent crops.

Tank Cleaning:

Do not drain or clean sprayer in an area where wastewater may drain into wells, other water bodies, or surrounding desirable vegetation. Flush tank, boom, and hoses with clean water for a minimum of ten minutes to remove all visible residues of the product. Fill the tank with water and add 1 L of household ammonia (minimum 3% ammonia content) per 100 L of rinse water and agitate. Flush solution through booms and hoses then top up tank with clean water. Agitate for 15 minutes, flush the hoses and booms again and then drain the tank. Remove nozzles and screens and clean separately in with the ammonia solution as above. Repeat the ammonia rinse procedure as above. Thoroughly rinse the tank with clean water for at least 5 minutes, flush water through hoses and booms, and drain. Dispose of wash solution by spraying in a waste area or on the treated field.

Hazard Rating:

Anthem: May cause slight skin irritation.
2,4-D Ester: Caution poison, eye irritant.
Merge adjuvant: Warning poison, skin irritant.
pH adjuster: Caution corrosive.

Assert 300 SC

Herbicide Group – 2
(Refer to page 20)

Company:

BASF

Formulation:

Assert - 300 g/L imazamethabenz formulated as a suspension concentrate. Container size - 2 x 10.8 L jugs per case.

pH adjuster - 94.5% sodium bisulfate formulated as a soluble granule. Container size - 2 x 0.5 kg bags (1 bag per 10.8 L jug of Assert).

Crops:

Annual ryegrass (seed production only)
Barley
Spring wheat (including durum*)
Sunflower (wild mustard and stinkweed control only)

* Although registered for use on durum wheat, crop injury has been reported in Manitoba.

Weeds:

Weeds controlled in cereals:

Wild oats	Wild buckwheat (suppression only)
Wild mustard	Tartary buckwheat (suppression only)
Stinkweed	

Weeds controlled in sunflowers:

Wild mustard	Stinkweed

Crop Stage:

Sunflowers - 2 to 8 leaf stage. Crop must be less than 15 inches (38 cm) tall except for semi-dwarf varieties, which must be less than 12 inches (30 cm), and dwarf varieties which must be less than 4 inches (10 cm). Stunting and head deformation can occur from applications made beyond recommended stages.

Cereals - 1 to 6 leaf stage.

Annual Ryegrass - 4 to 6 leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

Wild oats - 1 to 6 leaf stage (all leaves, including tillers) up to 2 tillers.

Wild mustard and stinkweed - cotyledon to 6 leaf stage.

Wild buckwheat and tartary buckwheat (suppression only) - cotyledon to 4 leaf stage.

Cost:

Sunflower - $7.82/acre (wild mustard only).

Cereals - $12.20 to $14.96/acre (2000 suggested retail price).

Rates:

pH adjuster - 1 packet per jug of Assert to be used.

Sunflowers - Apply 0.34 L/acre. One 10.8 L container treats 32 acres.

Cereals, Annual Ryegrass - Apply 0.54 L/acre if majority of wild oats are in the 1 to 3 leaf stage. One container treats 20.3 acres.

Apply 0.67 L/acre if majority of wild oats are in the 4 to 6 leaf stage (all leaves, including tillers) up to 2 tillers or when tank mixing with a broadleaf herbicide. One 10.8 L container of Assert treats 16.6 acres.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

Apply in 5 to 10 gallons/acre (23 to 45 L/acre) water when tank mixing Assert with Estaprop, 2,4-D ester, or MCPA ester. For all other applications, apply in 10 gallons/acre (45 L/acre) water.

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

How it Works:

Assert is a systemic herbicide that is translocated to growing points in plants. It is absorbed through the foliage and the roots of weeds. Symptoms appear in 1 to 2 weeks as yellowing of newest leaves which spreads, leading to browning and plant death.

Effects of Growing Conditions:

Do not apply Assert 24 hours before or after a frost. It works best at warm temperatures. Performs relatively consistently under dry conditions. If cold, wet soil conditions persist in the days after application, retillering of wild oats may occur. Do not apply to drought stressed sunflowers.

Tank Mixes:

Assert must be applied at 0.67 L/acre when tank mixed with other herbicides for additional broadleaf weed control.

Spring Wheat (including durum) and Barley:
2,4-D Ester* - up to 0.32 L/acre (700 g/L formulations)
Curtail M - 0.80 L/acre
Dichlorprop + 2,4-D (Estaprop only)* - 0.70 L/acre
Express Pack - 40 acres per case.
MCPA Ester* - up to 0.45 L/acre (500 g/L formulations)
Puma Super** - 0.15 L/acre
Puma Super + MCPA Ester, or Refine Extra (at rates listed)
Refine Extra - 8 g/acre
Refine Extra (8 g/acre) + MCPA Ester 0.28 to 0.45 L/acre (500 g/L formulations)
Unity - 40 acres per case

Spring Wheat (NOT including durum) and Barley:
Attain - 40 acres per case.
Prestige - 20 acres per case

Spring wheat and durum wheat only:
Dichlorprop + 2,4-D (Turboprop 600 only) - 0.70 L/acre

* apply in 5-10 gal/acre (23-45 L/acre). For all other tank mixes use 10 gal/acre (45 L/acre)

** use the 0.54 L/acre rate of Assert when tank mixing with Puma Super

Refer to tank mix partner for additional crop staging restrictions.

Tank mixes containing Refine Extra must be used within 12 hours or product degradation may occur. Refer to the product label for application details.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours will reduce control.

Grazing: Do not graze treated fields or cut treated forage for silage or hay. Matured barley and wheat grain or straw from fields treated with Assert can be fed to livestock. Do not feed or graze treated annual ryegrass.

Recropping:

Year After Application	Black and Grey Wooded Soils	Brown and Dark Brown Soils
Year 1	Spring wheat (including durum), barley, canola, field peas, flax, sunflowers	Spring wheat (including durum), CLEARFIELD canola, barley, sunflowers
Year 2	Spring wheat (including durum), barley, canaryseed, canola, field peas, flax, oats, sunflowers	

Recropping Cont'd:

Conduct a field bioassay (a test strip grown to maturity) the year before growing any crop not listed in the table. Lentils are known to be particularly sensitive to Assert residues in the soil. The additive effect of soil residues from the use of Assert and sequential applications of Ally or Unity (not for use in Manitoba) herbicides on the same land area has not been determined. Crop rotation guidelines are not known and injury to rotational crops other than wheat (excluding durum) may occur. Plant only wheat (excluding durum) on fields where these herbicides have been used until a field bioassay demonstrates other crops can be grown successfully.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Environment: Leave a distance of 15 m between the outside boundary of the sprayed area and bodies of water (lakes, ponds, sloughs, streams, rivers, etc.).

Tank Cleaning:

Non-labelled grass and broadleaf crops can be damaged by in-tank residues. The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Assure II

Herbicide Group – 1
(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

Assure II - 96 g/L quizalofop-p-ethyl formulated as an emulsifiable concentrate. Container size - 8 L.

Sure-mix adjuvant. Container size - 8 L.

Crops:

Canola, flax (including Solin or low linolenic acid varieties), lentils, peas (field and processing), soybeans, alfalfa (seed production), and seedling bird's-foot trefoil, sainfoin, clovers (white, red, alsike and sweet) for seed production* and creeping red fescue for seed*.

* Since these crops have been registered under minor use application, the manufacturer assumes no responsibility for herbicide performance.

Weeds:

Green foxtail, barnyard grass, wild oats, quackgrass, volunteer corn, volunteer wheat, volunteer barley, volunteer oats.

Weed Stage:

Wild oat - At the 0.15 L/acre rate, apply from the 1 to 5 leaf stage before tillering begins. At the 0.20 L/acre rate applications can be made to plants with up to 2 tillers. Best results are likely to occur if applications are made before tillering begins.

Volunteer oats - 2 leaf to early tillering (best results achieved before tillering begins).

Green foxtail, barnyard grass, volunteer wheat, volunteer barley - 2 leaf stage until early tillering.

Volunteer corn - 2 to 6 leaf stage.

Quackgrass - 2 to 6 leaf stage.

Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

Crop Stage:

No leaf stage restrictions, but do not apply beyond preharvest intervals listed in the table:

CROP	PREHARVEST INTERVAL DAYS
Canola	64
Flax (including low linolenic acid varieties)	82
Soybeans	80
Lentils	65
Peas	65

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Costs:

$12.38 to $24.75/acre (2000 suggested retail price).

Rates:

WEEDS	ASSURE II	
	L/ACRE	ACRES TREATED PER CONTAINER
Green foxtail, wild oats, volunteer wheat, barley, oats and corn	0.15	54
Barnyard grass, wild oats, quackgrass (suppression)	0.20	40
Quackgrass (season long control)	0.30	26

Add Hi-Mix at a rate of 0.5 to 1.0 L per 100 L spray solution or Sure-Mix at a rate of 0.5 L per 100 L spray solution. Use the highest rate when wild oats or quackgrass are present in the field or when growing conditions are poor.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

210 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan with 50 mesh or coarser nozzle screens.

How it Works:

Assure and Assure II are systemic herbicides which are rapidly absorbed and readily translocated from the treated foliage to the root systems and growing points of treated plants. Symptoms include a reduction in growth, and discoloration within 1 to 3 weeks.

Effects of Growing Conditions:

Crop injury may occur if crops are stressed because of drought or flooding. Less than acceptable weed control may be expected if weeds are under stress because of drought, flooding or cool weather.

Tank Mixes:

Herbicides: In canola Assure II may be tank mixed with:
Muster (8 to 12 g/acre)

In soybeans Assure II may be tank mixed with:
Pinnacle (2.2 to 3.3 g/acre).

In established creeping red fescue for seed, Assure II at 0.2 to 0.3 L/acre may be tank mixed with: Ally (3 g/acre)

Allow 24 hours after application before applying a broadleaf herbicide. If the broadleaf herbicide is applied first, wait 7 days before application of Assure II.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour of application may reduce control.

Grazing: Do not graze treated crops or cut for feed prior to crop maturity.

Recropping: No restrictions the year after treatment.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Environment: Do not apply within 15 m of sensitive habitats such as shelterbelts, wetlands, sloughs, or woodlots.

Tank Cleaning:

Remove nozzles, screens and flush tank, pump, hoses and boom with a minimum of 3 changes of water. Clean nozzles and screens separately.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning eye and skin irritant

This product contains 4 percent phenol, which has been determined to be of toxicological concern.

Atrazine

Herbicide Group – 5
(Refer to page 20)

Company:

Syngenta (Aatrex Liquid, Aatrex Nine-0).
United Agri Products (Atrazine 480, Atrazine 90 WG).
Van Waters and Rogers Ltd. (Drexel Atrazine 500).

Formulations:

Aatrex Liquid/Atrazine 480 - 480 g/L atrazine formulated as a liquid.

Drexel Atrazine 500 - 500 g/L formulated as a liquid.

Aatrex Nine-0/Atrazine 90 WG-90 percent atrazine formulated as a dispersible granule.

Container sizes - various.

Crops:

Corn (silage, field, sweet).

Weeds:

Common purslane
Lady's-thumb
Lamb's-quarters
Ragweed
Redroot pigweed
Smartweed
Volunteer clover
Wild buckwheat
Wild mustard
Wild Oats
Wormseed mustard

Crop Stage:

Preplant incorporated (PPI)

Pre-emergent surface treatments (after planting but before emergence of weeds and crop) - are recommended only on irrigated fields. Inconsistent weed control will occur if 0.5 inches (1.25 cm) of water/precipitation does not occur within 7 days of application.

Postemergence treatment - 1 to 6 leaf stage and when corn is less than 12 inches (30 cm) tall.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

Broadleaf weeds (postemergence applications) - less than 4 inches (10 cm) tall.

Rates:

	RATES		
	ATRAZINE 90 WG, AATREX NINE-O	ATRAZINE 480, AATREX LIQUID	DREXEL - ATRAZINE 500
Preplant incorporated; Pre-emergence (irrigated corn only)	0.45 to 0.69 kg/acre	0.85 to 1.25 L/acre	0.81 to 1.21 L/acre
Postemergence	0.45 to 0.69* kg/acre	0.85 to 1.25* L/acre	0.81 to 1.21 L/acre

* Add 1.11 to 2.23 L/acre of oil concentrate or 6.88 L/acre crop oil with postemergence applications of these products.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Crop injury may occur when Atrazine and oil is applied postemergence during cold weather.

Use the low rate on crops grown on sandy soils, and where weed infestations are light.

Cost:

$4.96 to $7.61/acre plus cost of adjuvant with post-emergent applications (2000 suggested retail price).

Water Volume:

15 to 30 gallons/acre (70 to 135 L/acre).

Pressure:

200 to 300 kPa (30 to 45 psi).

Nozzles:

Flat fan with 50-mesh or coarser screens.

How it Works:

Atrazine is a systemic herbicide which is absorbed by roots and foliage. Photosynthesis is blocked. Symptoms may be noticeable 7 to 10 days after treatment.

Effects of Growing Conditions:

Postemergent applications made during periods of cold weather may cause crop lightening. Hot, dry weather preceding postemergent applications may result in reduced weed control. Atrazine will move with soil if eroded.

Tank Mixes:

Herbicides: PPI - Eradicane (not sweet corn), Bladex.
Preemergent Surface - Banvel II[2], Bladex
Post-Emergence[1] - Banvel II (not sweet corn), Bladex, Pardner.

[1] do not use oils or adjuvants with postemergent tank mixes.
[2] Drexel Atrazine 500 only.

Fertilizers: For pre-emergence applications, nitrogen solutions or complete liquid fertilizers may replace all or part of the water as a carrier for some formulations of atrazine. AAtrex Nine-O and AAtrex Liquid may be impregnated onto dry granular fertilizers. Do not impregnate onto nitrate or super-phosphate.

Do not apply atrazine with nitrogen fertilizer after corn has emerged, as crop injury will occur.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 2 hours of postemergence applications may result in reduced weed control.

Grazing: Do not graze or cut for feed before ear emergence.

Recropping: All crops, except corn and triazine-tolerant canola, may be affected the year following the use of atrazine. Flax, peas and fababeans have some tolerance to atrazine residues and are usually not affected by rates of up to 0.9 L/acre (500 g/L formulations) or 0.5 kg/acre (90 percent atrazine formulations) applied the previous year. Other more sensitive crops may be affected 2 or more growing seasons after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze Aatrex Liquid or Atrazine 480.

Environment: Do not mix or load within 30 m, or apply within 10 m, of any wells, lakes, streams, ponds, dugouts or sinkholes.

Tank Cleaning:

When finished spraying atrazine, run clean water through the tank, pump and lines. Drain and refill with 1 L of household ammonia per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces but do not enter tank. Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Attain

Herbicide Group – 4
(Refer to page 20)

Company:

Dow AgroSciences.

Formulation:

The Attain package has 2 components: Attain A contains 180 g/L fluroxypyr and Attain B contains 564 g/L 2,4-D LV ester. Attain is formulated as an emulsifiable concentrate. Container sizes - Attain A - 9.6 L, Attain B - 2 x 8 L.

Crops:

Spring wheat (not durum) and barley.

Weeds and Staging:

Weeds controlled at the 2 to 4 leaf stage, unless specified include:

Bluebur
Burdock
Cleavers (1 - 4 whorls)
Clover (sweet)
Cocklebur
Field horsetail[1]
Flixweed
Goat's beard
Hoary cress[1]
Kochia
Lamb's-quarters
Mustards
  (except dog and tansy)
Plantain
Prickly lettuce
Ragweed
Round leaved mallow
  (1 - 6 leaf)
Shepherd's-purse
Stinkweed
Stork's-bill
  (1 - 8 leaf)
Sunflower (annual)
Vetch
Volunteer canola
Volunteer flax
Wild radish
Wild buckwheat (1 - 4 leaf)
Wild mustard

The following weeds will be controlled only when growing rapidly (control may be reduced when weed infestations are heavy).

Blue lettuce[1]
Dandelion[2]
Docks
Dog mustard
Field bindweed[1]
Field peppergrass
Lady's-thumb
Leafy spurge[1]
Oak-leaved goosefoot
Redroot pigweed
Russian thistle
Smartweed
Tansy
Tartary buckwheat

Weeds suppressed include:

Annual sow-thistle
Canada thistle[1]
Common chickweed(up to 3 inches (8 cm) in height
Hemp-nettle (2 - 6 leaf stage)
Perennial sow thistle[1]

[1] Top growth only
[2] Spring rosettes only.

Crop Stage:

4 leaf to flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Cost:

$8.48/acre (2000 suggested retail price).

Rate:

Apply Attain A at 0.24 L/acre and Attain B at 0.40 L/acre. One case of Attain treats 40 acres. Make only one application per year.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre).

How it Works:

The components of Attain herbicide tank mix move within the plant to control exposed and underground plant tissues. The active ingredients in Attain mimic naturally occurring plant hormones which control weeds by disrupting normal plant growth patterns. Injury symptoms include epinasty (twisting of the stems and leaves) and swollen nodes.

Effects of Growing Conditions:

Attain activity is influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought, heat or cold stress) or if extremely heavy infestations exist.

Tank Mixes:

Herbicides:

In spring wheat (not including durum) and barley, Attain may be tank mixed with:

Achieve 80DG (0.1 kg/acre) plus Turbocharge adjuvant.*
Assert (0.53 to 0.65 L/acre)

In spring wheat (not including durum) only, Attain may be tank mixed with:

Horizon (0.095 to 0.115 L/acre) plus Score adjuvant.*
Puma Super (0.2 to 0.4 L/acre)

Insecticides: None registered.

Fungicides: None registered.

*Temporary crop injury (Achieve only) or reduced wild oat control may occur with these tank mixes.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not permit lactating dairy animals to graze fields within 7 days of application. Do not harvest forage or cut hay within 30 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Preharvest: Do not apply within 60 days of harvest.

Recropping: Wheat, barley, oats, rye, forage grasses, flax, canola, mustard, lentils and peas may be grown the year after an Attain application. There are no recropping restrictions the second year after application.

Aerial Application: Do not apply by air.

Storage: May be frozen. If frozen, bring to room temperature and agitate before use.

Tank Cleaning:

Drain tank, and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for 10 minutes. Fill the tank with water and recirculate for 15 minutes. Spray part of the mixture through the hoses, boom and nozzles. Drain tank. Remove nozzles and screens and clean them separately. If sprayer is to be used on crops other than cereals, repeat the above process again, and clean outside of sprayer equipment.

Hazard Rating:

Danger Poison.

Warning Eye Irritant.

Caution Skin Irritant.

Avadex BW/Avadex MicroActiv

Herbicide Group – 8
(Refer to page 20)

Company:

Monsanto Canada Inc.

Formulation:

400 g/L triallate formulated as an emulsifiable concentrate. Container sizes - 22.7 L, 115 L.

10 percent triallate formulated as a granular. Container size - 22.7 kg, 454 kg.

Crops:

Spring wheat (including durum)
Barley
Canaryseed (granular formulation only)
Flax (not including low linolenic acid varieties)
Rapeseed (including canola)
Mustard
Field peas (liquid formulation only)
Seedling alfalfa
Seedling red clover
Seedling alsike clover
Seedling sweet clover
Seedling bird's-foot trefoil

Use on forage seedling crops only when underseeded with a cover crop.

Weeds:

Wild oats.

Crop Stage:

May be applied in fall or spring prior to crop emergence. In spring, may be applied before seeding (all labelled crops) or after seeding (barley, canaryseed, spring and durum wheat only).

Weed Stage:

Pre-emergence.

Cost:

$9.21 to $16.97/acre (liquid), $11.26 to $22.51/acre (granulars) (2000 suggested retail price).

Rates:

Apply according to the tables.

Apply recommended rates for the companion crop when using in underseeded alfalfa, trefoil, or clover species.

Avadex BW Liquid Rates – Spring Treatment

CROP	APPLICATION TIMING	RATE (L/acre)		ACRES TREATED PER 22.7 L CONTAINER	
		Organic Matter		Organic Matter	
		4% or less	Greater than 4%	4% or less	Greater than 4%
Spring and durum wheat	Before Seeding[1] After Seeding	1.21 1.42	1.42 1.72	18.8 16.0	16.0 13.2
Barley	Before and After Seeding	1.42	1.72	16.0	13.2
Rapeseed (including canola), flax, mustard	Before Seeding	1.72	2.23	13.2	10.2
Peas (dry)	Before Seeding	1.72	1.72	13.2	13.2

[1] Do not apply this product before seeding wheat in soils with 4 percent or less organic matter (brown, dark brown or grey wooded soils) where discers are to be used for seeding. If an air seeder is to be used, it must be equipped with a depth control device to ensure accurate seed placement, otherwise crop injury may occur.

Avadex BW Granular Rates – Fall Treatment

CROP	RATE (KG/ACRE)			ACRES TREATED PER 22.7 KG CONTAINER		
	Organic Matter			Organic Matter		
	Less than 2%[1]	2-4%	Greater than 4%	Less than 2%[1]	2-4%	Greater than 4%
Spring and durum wheat	4.45	5.67	6.88	5.1	4.0	3.3
Barley, canaryseed	4.45	5.67	6.88	5.1	4.0	3.3
Rapeseed (including canola), flax, mustard	5.67	6.88	8.90	4.0	3.3	2.6

[1] Fall treatments conducted under minimum tillage are not recommended on soils with less than 2 percent organic matter.

Avadex BW Granular Rates – Spring Treatment

CROP	APPLICATION TIMING	RATE (KG/ACRE)		ACRES TREATED PER 22.7 KG CONTAINER	
		Organic Matter		Organic Matter	
		4% or less[1]	Greater than 4%	4% or less	Greater than 4%
Spring and durum wheat	Before Seeding[2,3] After Seeding	4.45 5.67	5.67 6.88	5.1 4.0	4.0 3.3
Barley, canaryseed	Before and				
	After Seeding[2] (barley only)	5.67	6.88	4.0	3.3
Rapeseed (including canola), flax, mustard	Before Seeding[2]	6.88	8.90	3.3	2.6

[1] Minimum tillage treatments must be applied to fields with at least 2 percent organic matter.

[2] Minimum tillage treatments must be applied 10 to 14 days before seeding or incorporating. For minimum tillage treatments on spring and durum wheat, apply 5.67 kg/acre on soils with 4 percent organic matter or less and 6.88 kg/acre on soils with greater than 4 percent organic matter.

[3] Do not apply this product before seeding wheat in soils with 4% or less organic matter (brown, dark brown or grey wooded soils) where discers are to be used for seeding. If an air seeder is to be used, it must be equipped with a depth control device to ensure accurate seed placement, otherwise crop injury may occur.

Water Volume:

10 gallons/acre (45 L/acre), liquid formulation only.

Pressure:

200 kPa (30 psi), liquid formulation only.

Nozzles:

Flat fan, liquid formulation only.

Application:

The liquid formulation must be incorporated into soil that is free of lumps or trash. The liquid formulation is recommended for spring use because soils are left in an erosion prone state if the liquid is fall-applied. The granular formulation may be incorporated into trashy soil and is best suited for fall use.

Fall Applications (Conventional Tillage): Apply Avadex BW granules to fields that are in good working condition, without excessive trash. Heavy trash or lumpy, wet fields may require tillage prior to application. Avadex BW must be applied after October 1 but before soil freeze-up. Application before October 1 may result in reduced weed control. Only one incorporation is required in the fall. The second incorporation may be done in the fall (before soil freeze-up) or in the spring.

Fall Application (Minimum Tillage): Applications of Avadex BW granules should be made to standing stubble, chemical fallow, or summerfallow fields that are not prone to erosion. Do not apply to smooth, hard packed soils that may allow granules to drift. If excessive crop residue exists at the time of application, harrowing should be conducted to ensure the granules are in good contact with the soil. Apply when the soil begins to cool (less than 4°C) and within 3 weeks of soil freeze-up. Incorporation can be performed in the spring before seeding or as part of the seeding operation.

Spring Application (Conventional Tillage): Apply Avadex BW (liquid or granules) to fields that are in good working condition, without excessive trash. Heavy trash or lumpy, wet fields may require tillage prior to application. Liquid formulations should be applied to fields with 30 percent or less trash cover. Avadex BW may be applied before or after seeding of wheat, barley, or canaryseed and before seeding of canola, flax, mustard or peas (liquid only). If wheat is being seeded into soils with an organic matter content of less than 4 percent, Avadex BW should be applied after seeding.

Spring Application (Minimum Tillage): Avadex BW granules should be applied in spring and when the soil temperature is 4°C or less. Apply granules 10 to 14 days before incorporation. Do not apply more than 4 weeks before seeding is intended.

Incorporation:

Conventional Tillage: Avadex BW applications require 2 incorporations, with the second incorporation at right angles to the first. Using a seeder that provides soil disturbance equivalent to a cultivator may replace 1 incorporation. The first incorporation of the granular formulation should be completed within 48 hours of application and the second incorporation should be delayed an additional 48 hours or more. The first incorporation of the liquid formulation should be completed as soon as possible after spraying, while the second incorporation may be done any time prior to crop emergence.

Incorporate to a depth of 2 inches (5 cm) by setting disc or cultivator implements to cut 3 inches (7.5 cm) into the soil. Mixing the product to greater depths will dilute the herbicide, decrease wild oat control, and may cause injury to cereals. Ensure that cereals are seeded below the treated layer (2 to 3 inches or 5 to 7.5 cm). Incorporations performed after seeding should be conducted with harrows or other suitable tillage equipment adjusted so as not to disturb the seed. Harrowing does not provide effective incorporation if compact soil prevents penetration of harrow teeth, if trash accumulates in the harrow sections, or if the harrows bounce.

Minimum Tillage: Incorporation of Avadex BW granules in minimum tillage systems is achieved with one high disturbance incorporation, which can be conducted prior to seeding, or as part of the seeding pass. A high disturbance system is one that disturbs the soil enough so that emerged weeds are controlled by the operation (example - air seeder with cultivator shovels). Harrowing after the incorporation operation is recommended for best results.

For optimum results in minimum tillage systems, incorporate when wild oat growth is noticeable in the field, as this will ensure that the soil is warm enough for activation of Avadex BW.

Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy wild oat infestations, use the conventional tillage guidelines for incorporation.

Summer Fallow: Incorporation can be done by a disc followed by harrowing at right angles, a vibrashank cultivator followed by harrowing at right angles, or double harrowing. The second operation can be delayed until spring. If summerfallow must be ridged to prevent soil erosion the granular formulation should not be used in the fall. Note that fall minimum tillage applied granules do not require incorporation in the fall. If soils must be ridged following application of the liquid formulation, ridging depth should be kept to a minimum as deep ridging may reduce wild oat control and increase crop injury.

How it Works:

Avadex BW is absorbed by germinating wild oat shoots. Death usually occurs before weed emergence. If conditions are dry or wild oats germinate from below the treated zone, the weeds may emerge, but will usually be controlled. As growth stops, leaves become bluish green in colour and brittle.

Effects of Growing Conditions:

Reduced control may result if prolonged cool conditions or dry soil conditions prevail at the time weeds are emerging. Thinning of wheat can occur under conditions of heavy rainfall or if cold soil conditions persist as the crop emerges.

Tank Mixes:

Herbicides: Avadex BW liquid may be tank mixed with liquid formulations of trifluralin for control of wild oats, green and yellow foxtail in wheat and barley. Apply after seeding but prior to crop emergence. Consult the recommendations for trifluralin for rates in different soil types.

Fertilizer: Avadex BW liquid alone, or tank mixed with liquid formulations of trifluralin, may be tank mixed with liquid fertilizer. Compatibility of the herbicide and liquid fertilizer should be checked. Follow the instructions on the herbicide label prior to adding the herbicide to the spray tank.

Avadex BW liquid may be sprayed on dry urea fertilizer. A minimum of 150 kg/ha (60 kg/acre) of dry urea fertilizer must be used. Only commercial blending is recommended.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Rainfall of at least 0.5 inches (1.5 cm) within 2 weeks of application is required for activation of Avadex BW.

Grazing: Do not graze the treated crop or use as hay or feed prior to crop maturity. Do not graze or feed treated forage crops in year of treatment.

Recropping: Do not seed tame oats the year after treatment with Avadex BW.

Aerial Application: Avadex BW Granular may be applied by air with attachments designed for applying low volumes of granules.

Storage: Do not freeze liquid formulations. Store granular formulations in a cool, dry place.

Tank Cleaning:

When finished spraying Avadex BW, run clean water through the tank, pump and lines. Drain and refill with clean water and 1 L of household ammonia per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces but do not enter tank. Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison (liquid formulation)

Skin and Eye Irritant (granular formulation)

Avenge 200 C

Herbicide Group – 8
(Refer to page 20)

Company:

BASF

Formulation:

200 g/L difenzoquat formulated as a solution.

Container size - 20 L.

Crops:

Alfalfa
Barley
Bird's-foot trefoil
Bromegrass
Canaryseed
Creeping red fescue
Crested wheatgrass
Fall rye (Cougar, Frontier, Kodiak, Puma, Rymin only)
Kentucky bluegrass
Meadow fescue
Orchardgrass
Red clover
Reed canarygrass
Russian wild ryegrass
Sweet Clover
Timothy
Triticale (Carman and Welsh)
Wheat (AC Barrie, Biggar, Bluesky, CDC Makwa, CDC Teal, Columbus, Conway, Cutler, Fielder, Genesis, Glenlea, Katepwa, Lancer, Leader, Neepawa, Oslo, Pasqua, Selkirk and Wildcat wheat varieties).
Winter wheat (Norstar only)

Use on forages only when underseeded to a cereal as listed above.

Weeds:

Wild oats.

Crop Stage:

Do not apply after the 6 leaf stage of cereal or grass crops.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

3 to 5 leaf stage.

Cost:

$16.78 to $20.33/acre (2000 suggested retail price).

Rate:

Apply Avenge 200 C at 1.42 to 1.72 L/acre. Use the higher rate if wild oat population exceeds 200 wild oats per m^2. One 20 L container treats 14.1 to 11.6 acres.

Water Volume:

Ground sprayer - 10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan directed 45° forward.

How it Works:

Avenge is mainly a contact herbicide. Symptoms appear in 3 to 7 days on newest leaves, which appear yellowed. Yellowing spreads, leading to browning and plant death.

Effects of Growing Conditions:

Crop injury is worse on cold or hot, humid days than when temperatures are moderate. Best weed control is attained when temperatures are 20 to 30°C, particularly when these temperatures follow application. Do not spray when crop or weeds are wet with heavy dew or rain. Do not apply when crop is under stress from drought, excessive moisture, or heat.

Tank Mixes:

Herbicides:

In wheat and barley, Avenge may be tank mixed with:

2,4-D ester (up to 0.45 L/acre of 500 g/L formulation). Do not use amine formulations.
2,4-DB (see 2,4-DB section for rates). May be used on cereals underseeded to forages.
Ally (2 to 3 g/acre)*
Ally + MCPA ester*
Buctril M (0.4 L/acre)
Curtail M (0.8 L/acre)
Dichlorprop + 2,4-D (0.71 L/acre)

MCPA ester (up to 0.45 L/acre of 500 g/L formulation). Do not use amine formulations.
Pardner (0.405 to 0.485 L/acre)
Pardner + MCPA ester
Thumper (0.4 L/acre)

*No additional adjuvant required.

In wheat only, Avenge may be tank mixed with:
Accord (0.054 to 0.068 L/acre)
Accord + **EITHER** Buctril M **OR** 2,4-D ester **OR** MCPA ester, **OR** Refine Extra.

In canaryseed, Avenge may be tank mixed with:
MCPA ester (0.38 to 0.45 L/acre of 500 g/L formulation)
Pardner (0.405 L/acre)

Insecticides: May be tank mixed with Lorsban and Pyrinex.

Fertilizers: None registered.

Allow a 5-day interval between the application of Avenge and other pesticides.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours of application will reduce control.

Grazing: Do not graze or feed treated cereal crop for 8 weeks after treatment. Do not graze or feed treated forages in the year of treatment. Straw from treated fields can be fed to livestock 8 weeks after application.

Recropping: No restrictions the year after treatment.

Aerial Application: May be applied by air in 2 to 5 gallons/acre (8 to 20 L/acre) water volume.

Storage: May be frozen.

Environment: Do not contaminate water bodies (sloughs, dugouts, lakes, streams, ponds, etc.).

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make a recommendation.

Non-labelled grass or broadleaf crops may be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison

Banvel II

Herbicide Group – 4
(Refer to page 20)

Company:

BASF

Formulation:

480 g/L dicamba solution.

Container sizes - 2 x 10 L jugs.

Crops:

Barley
Canaryseed
Chemfallow
Established turf
Fall stubble
Field corn
Oats
Pre-seeding cereals
Native grass pastures
Red fescue
Roadside
Spring rye
Spring wheat (including durum)
Winter wheat

Seedling grasses:

Creeping red fescue, Crested wheatgrass, Intermediate wheatgrass, Meadow fescue, Meadow foxtail, Orchardgrass, Pubescent wheatgrass, Slender wheatgrass, Smooth bromegrass, Streambank wheatgrass, Tall fescue, Tall wheatgrass, Timothy

Weeds:

Weeds controlled by Banvel II + 2,4-D amine or MCPA amine tank mixes for cereals:

Burdock
Canada thistle (top growth control only)
Cleavers (higher rate only)
Cocklebur
Corn spurry
Cow cockle
Flixweed
Green smartweed
Hemp-nettle (MCPA K mixes only)
Kochia
Lady's-thumb
Perennial sow-thistle (top growth control only)
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's-purse
Tartary buckwheat
Volunteer canola
Volunteer sunflower
Wild buckwheat
Wild radish

Weeds controlled by Banvel II + Roundup tank mixes for reduced tillage applications prior to seeding wheat, barley, rye, oats and field corn:

Downy brome
Flixweed
Cleavers
Cow cockle
Foxtail barley (suppression only)
Green foxtail
Kochia
Lady's-thumb
Lamb's-quarters
Persian darnel
Redroot pigweed
Russian thistle
Smartweed
Stinkweed
Volunteer canola*
Volunteer cereals
Wild buckwheat
Wild mustard
Wild oats

*Not Roundup Ready varieties

Weeds controlled in pasture:

Banvel II at 0.85 L/acre

Canada thistle
Curled dock (top growth only)
English daisy
Field bindweed
Goldenrod
Perennial sow-thistle

Banvel II at 1.86 L/acre:

Diffuse knapweed
Goat's-beard
Ground cherry
Pasture sage
Povertyweed
Sheep sorrel
Thyme-leaved spurge

Banvel II tank mixed with 2,4-D amine or ester will control the following species. See label for rates.

Alder
Cherry
Poison ivy
Prickly rose
Western Snowberry
Wild rose
Wolf (silver) willow

Weed Stage:

Annual broadleaf weeds: 2 to 3 leaf stage.

Winter annuals: rosettes less than 2 inches (5 cm) across.

Canada thistle, sow-thistle in summerfallow: apply to Canada thistle and perennial sow-thistle before the bud stage. Must be applied to thistle with 6 to 10 inches (15 to 25 cm) of new growth.

Brush control in pastures: when brush is actively growing and is 6 feet (2 m) in height or less (in spring or early summer).

Canada thistle control in fall stubble: when thistles exhibit new growth and at least 2 weeks prior to a killing frost.

Crop Stage:

CROP	STAGE
Spring wheat, oats, barley	2 to 5 leaf.
Canaryseed	3 to 5 leaf.
Winter wheat	In spring when crop is 6 to 10 inches tall (15 to 25 cm) - prior to flag leaf.
Spring rye	2 to 3 leaf
Corn, field	Banvel II alone as a broadcast spray: apply up to 8 inches (20 cm) height on the corn as it stands. Banvel II + 2,4-D as a broadcast spray: apply up to 4 inches (10 cm) height on the corn as it stands. When corn is higher, drop nozzles must be used to direct the spray to plant base. Apply no later than 2 weeks prior to tassle emergence and before the corn is over 20 inches (50 cm).
Red fescue	For seedling stands, apply when crop is 2 inches (5 cm) tall. For established red fescue, apply up to the flag leaf stage of the crop.
Established turf	Apply to newly seeded grasses only after second mowing. Do not apply to bent grasses.
Seedling grasses	2 to 4 leaf

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Cost:

Cost of Banvel II when tank mixed with MCPA/2,4-D in cereals (not including cost of MCPA/2,4-D) - $3.06 to $3.85/acre.

Cost per L - $32.90 (2000 suggested retail price).

Rates:

See rate table on next page.

Water Volume:

Preseeding burnoff: 5 to 10 gallons/acre (23 to 45 L/acre)

Annual crops: 10 gallons/acre (45 L/acre)

Pastures, summerfallow and stubble: 10 to 20 gallons/acre (45 to 90 L/acre)

Corn: 20 to 30 gallons/acre (90 to 135 L/acre)

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

How it Works:

Banvel II is a growth regulator type herbicide that is absorbed primarily by foliage but also through plant roots. It is a systemic herbicide that is translocated throughout plants, causing rapid, undifferentiated growth and bending and twisting of stems and leaves, resulting in plant death in 2 to 3 weeks.

Effects of Growing Conditions:

Crop damage (stunting, reduced seed set) can occur if the chemical is applied at any time other than the recommended stage. Do not apply to crop under stress from adverse environmental conditions, such as excess moisture, drought and disease. Apply when air temperature is between 10 and 25°C.

Do not apply:

- when there is a risk of severe temperature fall in the night;
- under high humidity, temperatures above 30°C, or fog conditions, to prevent drift to sensitive crops;
- when wind is blowing toward a nearby sensitive crop;
- when winds are gusty up to 5 mph (8 km/hr).

Tank Mixes:

Herbicides:
Barley, wheat - Sencor (2-3 leaf stage), 2,4-D, MCPA
Winter wheat - 2,4-D, MCPA
Canaryseed - MCPA
Corn, pastures and non-crop areas - 2,4-D
Chemical fallow, stubble - 2,4-D, Roundup, Touchdown
Oats - MCPA, MCPAK
Red fescue, spring rye - 2,4-D
Seedling grasses - 2,4-D
Preseeding burnoff - Roundup

Fertilizers: None registered.

Insecticides: May be tank mixed with Decis, Lorsban and Pyrinex.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

CROP/TANK MIX (all 2,4-D and MCPA rates are for 500 g/L formulations)	RATE OF BANVEL II	
	L/ACRE	ACRES PER 10 L CONTAINER
Barley (tank mixed with 0.344 L/acre MCPA or 2,4-D amine	0.093	107.5
Wheat (spring and winter) (tank mixed with 0.344 L/acre MCPA or 2,4-D amine)	0.093 - 0.117	107.5 to 85.5
Spring rye (tank mixed with 0.344 L/acre 2,4-D amine	0.093 - 0.117	107.5 to 85.5
Canaryseed (tank mixed with 0.344 L/acre MCPA amine	0.117	85.5
Oats (tank mixed with 0.344 L/acre MCPA amine or 0.446 L/acre MCPAK)	0.093 - 0.117	107.5 to 85.5
Corn, field	0.243	41
Corn, field (tank mixed with 0.344 L/acre 2,4-D amine)	0.117	85.5
Red fescue	0.243	41
Seedling grasses (tank mixed with 0.344 L/acre 2,4-D amine)	0.093 - 0.117	107.5 to 85.5
Pastures	0.84 - 1.86	12 to 5.5
Established turf	0.51	19.5
Chemical fallow (tank mixed with 0.445 L/acre of 2,4-D or 0.4 L/acre of glyphosate).	0.093 to 0.117 (Use 0.243 L/acre for wild buckwheat control when mixed with glyphosate)	85.5
Thistle suppression on fall stubble (tank mixed with 0.7 L/acre glyphosate plus 0.14 L/acre non-ionic surfactant).	0.5 (Use 1 L/acre Banvel II if not tank mixing)	20
Prior to seeding wheat, barley, oats, rye and field corn (tank mixedwith 0.378 L/acre glyphosate plus non-ionic surfactant at 0.5 L per 100 L spray solution)	0.127	78.5

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing and Harvest: Canaryseed - Use only as bird seed.

Corn - Do not graze cattle or harvest for silage until 7 days after treatment of Banvel II or Banvel II + 2,4-D amine.

Cereals, seedling grasses, pasture - If treated vegetation has been consumed by meat animals w[illegible]n 30 days of Banvel II application, feed the animal w[illegible]reated diet for 30 days before slaughter. Meat animals may graze or feed on treated pasture 30 days after Banvel II application without restrictions on slaughter.

Dairy cattle - no restrictions up to 0.50 L/acre.

Use the following guidelines for feeding Banvel II-treated forage to dairy animals:

RATE/ACRE	DELAY BETWEEN TREATMENT AND HAYMAKING/GRAZING (DAYS)
up to 0.5 L	0
0.501 L to 0.93 L	7
0.931 L to 1.86 L	14
1.861 L to 2.87 L	30

Recropping: Grow only cereals, corn, soybeans or white beans the year after treatment with the 1.0 L/acre rate. Grow only cereals, corn, field beans, soybeans or canola the year after applications of 0.5 L/acre. If applications are made after September 1, or if dry weather persists after application, crop injury may occur the following spring.

Aerial Application: May be applied by air on cereals only. Use a minimum of 2 gallons/acre (8 L/acre).

Storage: May be stored at freezing temperatures.

Environment: Do not contaminate domestic or irrigation water. Do not apply around desirable trees or plants or near the root zone of these plants.

Tank Cleaning:

When finished spraying Banvel II, thoroughly hose down the inside as well as outside surfaces of equipment while filling the spray tank half-full of water. Flush by operating sprayer until the system is purged of the rinse water. Fill tank with water while adding 1 L of 3% household ammonia for every 100 L of water. Operate the spray pump to circulate the ammonia solution through the sprayer for 15 to 20 minutes and discharge a small amount of ammonia solution through the spray boom and nozzles. Flush the solution out of the spray tank through the boom. Remove the nozzles and screens and flush the system with 2 tanks full of water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Basagran

Herbicide Group – 6

(Refer to page 20)

Company:

BASF

Formulation:

480 g/L bentazon formulated as a solution.

Container size - 2 x 9 L jugs.

Crops:

Corn (grain, silage, sweet and seed)
Dry beans (including white, kidney, black and pinto)
Fababeans
Flax, solin (low linolenic varieties)
Peas[1]
Soybeans
Spring wheat (not durum)

Seedling legumes and grasses for seed production only:

Alfalfa[2]
Alsike clover
Bromegrass
Creeping red fescue
Crested wheatgrass
Meadow foxtail
Orchardgrass
Red clover
Sainfoin[2]
Sweet clover (established only)
Timothy

[1] Field peas only. DO NOT apply to chickpeas.
[2] Can also be applied to established stands.

Cost:

Cereal rate: - $11.62/acre + 2,4-D cost.
Other crops: - $20.62 to $26.44/acre, not including adjuvant.
Two applications for perennial weed control - $41.24/acre.
(2000 suggested retail price).

Crop Stage:

CROP	STAGE
Soybeans	No restrictions
Dry beans	After the first trifoliate leaf
Corn (grain, silage, sweet and seed)	No restrictions
Peas (field and canning)	After 3 pairs of leaves
Fababeans	At least 4 inches (10 cm) tall
Flax, Solin (low linolenic varieties)	After 2 inches (5 cm) in height
Turf	Must be established
Seedling forage grasses*	1 to 7 leaf stage
Forage legumes*	After the third trifoliate leaf
Spring wheat	4 leaf to flag leaf

*One application per season.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Basagran alone:

Apply the rate of Basagran listed when weeds in the table are within the recommended height:

WINTER ANNUAL WEEDS	0.71 L/acre		0.91 L/acre	
	inches	(cm)	inches	(cm)
Buttercup			2 - 4	(5 - 10)
Cleavers			1 to 3 whorl stage	
Cocklebur	3 - 7	(7.5 - 17.5)	7 - 12	(17.5 - 30.0)
Common chickweed			1 to 3 weeks after emergence	
Common groundsel			2 - 4	(5 - 10)
Common ragweed			1 - 2	(2.5 - 5.0)
Corn spurry			1 - 4	(2.5 - 10.0)
Giant Ragweed			2 - 6	(5 - 15)
Hairy galinsoga			2 - 3	(5.0 - 7.5)
Hairy Nightshade			0.2-0.8	(0.5 - 2.0)
Lady's-thumb (smartweed)	1 - 3	(2.5 - 7.5)	3 - 8	(7.5 - 20.0)
Lamb's-quarters			0.5 - 1.0	(1.3 - 2.5)
Purslane			1 - 2	(2.5 - 5.0)
Redroot pigweed			0.5 - 1.5	(1.3 - 3.8)
Russian thistle			1 - 3	(2.5 - 7.5)
Shepherd's-purse	Rosette-4	(Rosette-10.0)	4 - 10	(10 - 25)
Stinkweed	Rosette-2	(Rosette-5.0)	2 - 6	(5 - 15)
Stork's-bill			2 to 6 leaf stage	
Venice mallow	1 - 2	(2.5 - 5.0)	2 - 4	(5 - 10)
Wild mustard	1 - 5	(2.5 - 12.5)	5 - 10	(12.5 - 25.0)
Wild radish			1 - 2	(2 - 5)
PERENNIAL WEEDS:	Repeat application 7 to 15 days after first application (if necessary).			
Canada thistle	6 - 8	(15 - 20)		
Field bindweed	1 - 2.5	(2.5 - 6.0)		
Yellow nutsedge	6 - 8	(15 - 20)		

Add Assist or XA oil concentrates at 0.41 to 0.810 L/acre. If hot, humid conditions prevail (above 28°C and 80 percent relative humidity), use only the low rate of Assist or XA oil concentrates. Citowett Plus may be used on peas at 0.25 L per 100 L spray mixture.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Water Volume:

10 to 40 gallons/acre (45 to 180 L/acre). A minimum of 18 gallons/acre (80 L/acre) is recommended for optimum control. Higher water volumes should be used when the weeds are at the upper end of their recommended treatment stage.

Pressure:

275 kPa (40 psi) to 300 kPa (45 psi).

Nozzles:

Flat fan nozzles capable of delivering high water volumes. Direct nozzles 45° forward.

Weeds, Stages and Use Rates:

For spring wheat (not durum) apply Basagran at 0.4 L/acre plus 2,4-D amine or ester (500 g/L) at 0.3 - 0.4 L/acre. This tank mix DOES NOT need any adjuvant and will control the following weeds when applied at the 2 - 4 leaf stage of the weeds.

Bluebur
Burdock (seedlings only)
Cocklebur
Common plantain
Falseflax
Flixweed (spring seedlings)
Goat's-beard
Lady's-thumb
Lamb's-quarters
Mustards
(except dog and tansy)
Prickly lettuce
Ragweed
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's-purse
Stinging nettle
Stinkweed
Sweet clover
Volunteer canola
Wild radish
Wild sunflower

How it Works:

Basagran is a contact herbicide which interferes with photosynthesis and is absorbed primarily through leaves. Weeds turn chlorotic (yellow) in 3 to 5 days and then brown, usually within 2 weeks.

Effects of Growing Conditions:

Poor results will occur if temperatures are cool. Optimum results are achieved when applied at daytime temperatures between 20 and 28°C. Applications at temperatures greater than 28°C may result in crop injury.

Tank Mixes:

Herbicides: Pinnacle at 2.2 to 3.2 g/acre (Soybeans only).

Fertilizers: 2.4 L/acre of ammonium sulphate or 4 L/acre of urea ammonium nitrate (UAN or 28-0-0) only in soybeans without other tank mix products. Do not use brass or aluminium nozzles with liquid fertilizers.

Insecticides: None registered.

Allow 4 days between application of Basagran and other herbicides, fertilizers or insecticides.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6-8 hours will reduce control.

Grazing: Do not graze the treated crop or cut for feed prior to crop maturity.

Recropping: No restrictions the year after application.

Aerial Application: May be applied by air for weed control in dry beans or soybeans only. Use 5 to 10 gallons/acre (23 to 45 L/acre) water volume. Assist or XA oil concentrate at 0.05 to 0.1 L/acre must be added. Do not use Assist or XA oil concentrate in excess of 0.1 L/acre as substantial crop injury could occur.

Crop canopy should not cover the weeds.

Storage: May be frozen.

Tank Cleaning:

Non-labelled broadleaf crops may be injured by in-tank residues.

Clean tank, nozzles, and lines with a strong detergent and rinse thoroughly after use. When tank mixing, follow tank mix instructions for cleaning tank mix partner as well.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Bladex L/Bladex 90 DF

Herbicide Group – 5
(Refer to page 20)

Company:

DuPont Canada Inc.

Formulations:

Bladex L - 480 g/L cyanazine formulated as a flowable. Container size - 10 L.

Bladex 90 DF - 90 percent cyanazine formulated as a water dispersible granule. Container size - 10 kg.

Crops:

Corn (field).

Crop Stage:

CROP	TREATMENTS
Corn (preplant incorporated)	Bladex L + Eradicane Bladex L + Dual Bladex 90 DF + Eradicane Bladex 90 DF + Dual
Corn (pre-emergence)	Bladex L Bladex 90 DF
Corn (postemergence - 1 to 3 leaf stage of corn)	Bladex 90 DF + BioVeg

Rates:

STAGING/TANK MIX	RATE	
	BLADEX L (L/acre)	BLADEX 90 DF (kg/acre)
Corn (preplant incorporated with Dual at 0.81 - 1.11 L/acre)	1.72 - 2.02	0.91 - 1.11
Corn (preplant incorporated with Eradicane at 1.72 - 2.23 L/acre)	1.72 - 2.02	0.91 - 1.11
Corn (pre-emergence) - irrigated fields only	1.92 - 2.33	1.01 - 1.21
Corn (postemergence with 1 L BioVeg per 100 L spray solution)	Not recommended	1.01

Use the low rate on sandy soils or low organic matter soils. Do not use on soils below 1 percent organic matter.

Weeds:

Barnyard grass
Black nightshade
Common purslane
Green foxtail
Kochia
Lady's-thumb
Lamb's-quarters
Oak-leaved goosefoot
Pigweed
Prostrate knotweed
Ragweed (common and false)
Russian thistle
Shepherd's-purse
Smartweed
(annual species)
Stork's-bill
Wild buckwheat
Wild mustard
Wormseed mustard
Yellow foxtail

Weed Stage:

For postemergence applications, apply when green and yellow foxtail are in the 1 to 2 leaf stage and when annual broadleaf weeds are in the 2 to 4 leaf stage except cleavers - 1 to 2 whorls; and volunteer flax - 1 to 2 inches (2 to 5 cm) tall.

Costs:

Corn - $17.65 to $24.46/acre (2000 suggested retail prices).

Water Volume:

15 gallons/acre (70 L/acre).

Pressure:

200 to 300 kPa (30 to 45 psi).

Nozzles:

Flat fan nozzles with 50-mesh or coarser in-line and nozzle screens. Do not use felt filters.

Incorporation:

For preplant incorporated treatments, incorporate twice with a tandem disk or S-tine cultivator set no deeper than 4 inches (10 cm) and travel at a speed of 10 km/hr (6 mph).

How it Works:

Cyanazine blocks photosynthesis of susceptible weeds. Evidence of control should be visible within 1 week.

Effects of Growing Conditions:

Application during hot, humid weather may result in a lightening of leaf colour in triazine-tolerant canola. Post-emergence applications on corn will cause crop injury if applied during periods of cold, wet weather, or if these conditions occur within 7 days of application.

Tank Mixes:

Herbicides: In corn (preplant incorporated), Bladex may be tank mixed with Eradicane 8-E, Dual, or Atrazine.

Fertilizers: Bladex 90 DF may be tank mixed with liquid fertilizers for preplant incorporated or pre-emergence application in corn. Conduct a compatibility test by performing a jar-test prior to mixing the products in the tank.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 2 hours may reduce control (postemergence applications).

Grazing: Do not graze or harvest for livestock feed prior to crop maturity.

Recropping: Plant only corn, cereals, potatoes, flax, rapeseed (canola), sunflowers, soybeans or peas the year after treatment.

Aerial Application: Do not apply by air.

Storage: Do not freeze Bladex L.

Tank Cleaning:

When finished spraying Bladex L/Bladex 90 DF, run clean water through the tank, pump and lines. Drain and refill with clean water. Flush sprayer system.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Danger Poison

Buctril M

Herbicide Groups – 4, 6
(Refer to page 20)

Company:

Aventis CropScience

Formulation:

280 g/L bromoxynil and 280 g/L of MCPA ester formulated as an emulsifiable concentrate. Container size - 8 L.

Crops:

- Barley
- Oats
- Wheat (spring, durum and winter)
- Flax, Solin (low linolenic varieties)
- Canaryseed (seed production only)
- Corn
- Fall rye

Seedling grasses (for seed production only)

- Bromegrass
- Creeping red fescue
- Crested wheatgrass
- Intermediate wheatgrass
- Meadow fescue
- Orchardgrass
- Reed canarygrass
- Russian wild ryegrass
- Slender wheatgrass
- Tall wheatgrass
- Timothy

Established Grasses

- timothy (for seed or hay)

Weeds and Staging:

Weeds controlled up to 4 leaf stage:

- American nightshade
- Bluebur
- Ball mustard
- Cocklebur
- Cow cockle
- Flixweed
- Green smartweed
- Kochia [2]
- Lady's-thumb
- Night-flowering catchfly
- Pale smartweed
- Redroot pigweed[1]
- Russian thistle [2]
- Scentless chamomile [3]
- Shepherd's-purse
- Volunteer canola
- Volunteer sunflower

[1] May not be controlled in flax.

[2] Control before plants are 2 inches tall.

[3] Spring seedlings only.

Weed controlled up to 6 leaf stage:

- Wild tomato

Weeds controlled up to 8 leaf stage:

- Common groundsel
- Common ragweed
- Lamb's-quarters
- Stinkweed
- Tame buckwheat
- Tartary buckwheat
- Wild buckwheat
- Wild mustard
- Wormseed mustard

Weeds with top growth controlled:

- Canada thistle
- Perennial sow-thistle

Crop Stage:

Barley, oats, wheat - 2 leaf to flag leaf stage.

Winter wheat - 2 to 4 leaf stage in the fall or after growth resumes in the spring, but prior to flag leaf.

Fall rye - apply from the time growth commences in spring to early flag.

Canaryseed - 3 to 5 leaf stage.

Flax, solin (low linolenic varieties) - 2 to 4 inches (5 to 10 cm) tall.

Corn - 4 to 6 leaf stage.

Seedling forage grasses - 2 to 4 leaf stage.

Established timothy - apply prior to the flag leaf.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Cost:

$6.38/acre (2000 suggested retail price).

Rate:

0.405 L/acre. One 8 L jug treats 20 acres.

Water Volume:

Corn - 20 to 30 gallons/acre (90 to 135 L/acre).
Flax, solin - 10 gallons/acre (45 L/acre).
Cereals - 5 to 10 gallons/acre (23 to 45 L/acre).
Seedling forage grasses - 15 gallons/acre (70 L/acre).
Established timothy - 15 gallons/acre (70 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan nozzles.

How it Works:

Bromoxynil is a contact herbicide. Therefore, good coverage is essential. Susceptible weeds turn brown and die in 3-5 days. MCPA is absorbed through the leaves and translocated throughout the plant. Small burnt spots appear on leaves within hours, and death of susceptible plants can take 2 weeks.

Effects of Growing Conditions:

Best weed control when humidity is high at the time of spraying and for the following day or two. Prolonged cool conditions may result in reduced weed control. Spraying during early morning may increase the risk of flax injury. Do not apply to flax, canaryseed or corn if daytime temperatures exceed 27°C within 48 hours before or after application.

Tank Mixes:

Herbicide Tank Mix Table:

Crop	Tank Mix Options
Flax	Fusion, Poast Ultra, Select
Solin (low linolenic flax varieties)	Select
Wheat (spring, durum and winter)	Accord*, Accord + Avenge**, Achieve*, Ally, Avenge*, Horizon*, MCPA amine, MCPA ester, MCPA K, Puma^{120} Super*, Puma Super*, Refine Extra (2.7 g/acre)
Barley	Achieve, Ally, Avenge, MCPA amine, MCPA ester, MCPA K, Puma^{120} Super Refine Extra (2.7 g/acre)
Oats	MCPA amine, MCPA ester, MCPA K

*Spring (including durum) only. **refer to Avenge label for registered varieties.

Fertilizers: None registered.

Insecticides: May be tank mixed with Decis, Lorsban and Pyrinex.

Fungicides: May be tank mixed with Tilt.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crops or cut for feed within 30 days of application.

Recropping: No recropping restrictions the year after treatment.

Aerial Application: May be applied by air to wheat, barley, and oats only. Must be applied in 2 to 4 gallons/acre (9 to 18 L/acre) water volume. Use higher water volume when the majority of weeds are cow cockle, smartweed, hemp-nettle, pigweed, and Canada thistle.

Storage: Liquid formulation may be frozen.

Preharvest: Do not apply to flax or solin (low linolenic varieties) within 60 days of harvest.

Tank Cleaning:

When finished spraying, thoroughly clean the sprayer by flushing with clean water containing detergent.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison

Casoron

Herbicide Group – 20
(Refer to page 20)

Company:

Uniroyal Chemical
(distributed by United Agri Products)

Formulation:

4 percent dichlobenil formulated as a granular. Container size - 3 kg, 15 kg.

Crops:

Shelterbelts.

Weeds:

- Artemisia[1]
- Bindweed[1]
- Canada thistle[1]
- Chickweed
- Dandelion[1]
- Foxtail (green and yellow)
- Groundsel
- Horsetail
- Knotweed
- Kochia
- Lamb's-quarters
- Loosestrife
- Mustard
- Nutsedge[1]
- Pigweed
- Plantain
- Purslane
- Shepherd's-purse
- Smartweed
- Sow-thistle
- Spurge
- Vetch[1]
- Wild buckwheat[1]

[1] Controlled with fall applications at the higher rates.

Timing:

In early spring or late fall prior to annual weed emergence, or after cultivation has removed existing weeds.

Weed Stage:

Pre-emergence.

Cost:

$7.47/kg (2000 suggested retail price).

Rates:

45 to 70 kg/acre. At the low rate, a 15 kg bag will treat a 4 yd by 407 yd (4 m by 340 m) strip of shelterbelt. At the high rate, a 15 kg bag will treat a 4 yd by 256 yd (4 m by 214 m) strip of shelterbelt. If application is followed by 0.5 to 1.0 inches (1.3 to 2.5 cm) of irrigation, the lower rates are recommended.

How it Works:

Casoron is a systemic herbicide absorbed by plant roots as they germinate. Weeds are controlled before they emerge.

Effects of Growing Conditions:

Do not apply during periods of high soil temperatures (more than 15°C).

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Storage: Store in a cool, dry place. May be frozen.

Grazing: Do not graze in treated area.

Equipment Cleaning:

The manufacturer does not provide enough information on equipment cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean equipment away from areas where family members or others are likely to frequent or walk.

Champion Extra

Herbicide Group – 1, 2
(Refer to page 20)

Company:

DuPont Canada Inc.

Formulations:

Champion: 92 g/L fenoxaprop-p-ethyl (plus safener) formulated as an emulsifiable concentrate. Container size - 2 x 8.1 L jugs.

Extra: 50 percent thifensulfuron methyl, 25% tribenuron methyl; formulated as a water dispersible granule. Container size - 2 x 162 gram containers

Crops:

Barley

Weeds Controlled and Staging:

Controlled:

Barnyard grass[1]
Chickweed (1-6 leaves)
Corn spurry
Cow cockle
Green foxtail[1]
Green smartweed
Hemp-nettle
Kochia
Lady's-thumb
Lamb's-quarters
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Tartary buckwheat
Volunteer canola*/rapeseed
Wild buckwheat (1-3 leaves)
Wild mustard
Wild oat[1]

Suppressed:

Canada thistle[2]
Cleavers (1-3 whorls)
Round-leaved mallow (2-6 leaves)
Scentless chamomile
Sow-thistle[2]
Stork's-bill
Toadflax (up to 6 inches on 15 cm tall)

*Not including CLEARFIELD canola varieties.

[1] 1 to 6 main stem leaves prior to emergence of 3rd tiller.

[2] up to 6 inches (15 cm), prior to bud stage.

Rate:

CHAMPION: 0.405 L/acre plus EXTRA: 8 g/acre. One case treats 40 acres (16.2 ha). Add EXTRA to the tank first. Let agitate for a few minutes then add CHAMPION.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Crop Stage:

Apply at the 2-5 main stem leaf stage with no more than 2 tillers. Treatment at the 3 to 4 leaf stage of the crop will give optimum crop tolerance and weed control. **Do not apply after the 2 tiller stage or crop injury will result. The 2 tiller stage generally occurs around 25 days after seeding.**

Cost:

$20.95/acre (2000 suggested retail price)

Water Volume:

10 gallons per acre (45 L/acre)

Pressure:

275 kPa (40 psi)

Nozzles:

80° or 110° flat fan nozzles

How it Works:

Fenoxaprop-p-ethyl is a systemic herbicide that is translocated from treated leaves to growing points in plants. Symptoms in grasses include reduced leaf growth and chlorosis (yellowing) of treated leaves within 1 to 3 days. Plant death occurs within 14 to 21 days after application.

Thifensulfuron and Tribenuron are systemic herbicides that are absorbed by the foliage and are translocated to growing points within plants. Growth of susceptible plants stops shortly after application. Symptoms include discolouration (yellowing, purpling, reddening) of the newest leaves and are visible in 1 to 3 weeks. Eventually the entire plant discolours and dies.

Effect of Growing Conditions:

Substantially reduced control and/or crop injury can occur when plants are stressed by very hot combined with very dry conditions and low humidity, severe weather conditions, frost, low fertility, drought, water saturated soil, disease or insect damage.

Tank Mixes:

Herbicides: MCPA Ester 500 at 0.34 L/acre

Fertilizer: None registered

Insecticides: None registered

A time interval of 7 days prior to application or 4 days after application of Champion Extra tank mix is required before any other pesticide can be applied.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Rainfall within 4 hours of application may lessen degree of weed control.

Grazing: Do not graze the treated crops or cut for hay.

Preharvest: 50 days.

Recropping: No restrictions when used as directed.

Aerial application: Do not apply by air

Storage: Store product in closed, original container in a cool, dry, well ventilated room. Do not freeze. If stored for 1 year or longer, shake well before using.

Tank Cleaning:

To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill the tank with water while adding 1 litre of household ammonia (minimum 3 percent ammonia) for every 100 L of water. Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes. Again flush hoses, boom and nozzles with the cleaning solution, and then drain the tank. Remove and clean the nozzles and screens separately in a bucket containing a 1 percent solution of ammonia in water. If the spray equipment is to be used to spray crops other than cereals, repeat the above process and thoroughly wash the spray mixture from the outside of the spray tank and the boom. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer again, flush the tank, boom and hoses for 5 minutes with fresh water.

Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

Hazard Rating:

Caution Poison

Eye and skin irritants

Champion Plus

Herbicide Group – 1, 2, 4

(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

The Champion Plus package contains 4 containers: 2 labelled "Champion FM" and 2 labelled "Plus". "Champion FM" contains 45 g/L fenoxaprop-p-ethyl, 210 g/L MCPA ester and 70 g/L 2,4-D ester, formulated as an emulsifiable concentrate. Container size - 8.1 L.

"Plus "contains 75 percent thifensulfuron methyl, formulated as a dry flowable. Container size - 81 grams.

Crops:

Barley.

Weeds Controlled and Staging:

Grass weeds (at the 1 to 5 leaf stage plus 2 tillers)

Wild oats
Green foxtail
Yellow foxtail

Broadleaf weeds with 2 to 4 main stem leaves or less than 4 inches (10 cm) tall, except where indicated:

Annual sunflower
Burdock
Canada thistle[3]
Chickweed (1-6 leaves)
Cocklebur
Corn spurry
Cow cockle
Field horsetail[1]
Flixweed[2]
Green smartweed
Mustards (except Dog, tansy)
Plantain[1]
Prickly lettuce
Ragweeds
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's-purse[2]
Stinkweed[2]
Vetch

Hemp-nettle
Hoary cress[1]
Kochia
Lady's-thumb
Lamb's-quarters
Volunteer canola
Wild buckwheat (1-3 leaves)
Wild radish

[1] Top growth control only.
[2] Spring seedlings only.
[3] Suppression only.

Crop Stage:

2 to 5 main stem leaves with a maximum of 2 tillers. Crop damage will occur if application is made earlier or later than the recommended leaf stages. Growers should be aware that injury to barley, as a result of Champion Plus applications made later than the recommended leaf stages, has been reported. Do NOT use beyond the 2 tiller stage, usually not more than 25 days after seeding.

Cost:

$20.50/acre (2000 suggested retail price).

Rates:

The Champion Plus box will treat 20 acres.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

80° or 110° stainless steel flat fan tilted forward at a 45° angle. Screens 50 mesh or larger.

How it Works:

Fenoxaprop-p-ethyl is a systemic herbicide that controls grassy weeds. Symptoms include reduced leaf growth and yellowing of the treated plants within 1 to 3 days. Chlorosis progresses and death of plants usually occurs in 2 to 3 weeks. MCPA and 2,4-D are systemic herbicides which control certain broadleaf weeds. They are translocated within the plant and cause rapid undifferentiated growth, which results in death of susceptible plants. Thifensulfuron methyl is a systemic herbicide which inhibits growth of susceptible broadleaf weeds. Symptoms (gradual discoloration) may not be noticeable for 1 to 3 weeks after application.

Effects of Growing Conditions:

Do not apply to crop that is stressed by severe weather conditions, frost, low fertility, drought, water-saturated soil, disease or insect damage, as crop injury and poor weed control may result. Very hot temperatures before or after application will stress plants and may result in reduced grass control.

Tank Mixes:

Herbicides: None registered.

Fertilizer: None registered.

Insecticides: None registered.

Do not tank mix with any other chemical additives, pesticides, or fertilizers. Do not use a surfactant with this tank mix. A time interval of 7 days prior to application or 4 days after application of Champion Plus is required before any other pesticide can be applied.

Restrictions:

Rainfall: Within 2 hours may reduce weed control.

Grazing: Do not graze treated crop or cut for feed prior to crop maturity.

Recropping: No restrictions the year after treatment.

Aerial Application: Do not apply by air.

Storage: Do not freeze. If stored for 1 year or longer, shake well before using.

Tank Cleaning:

The "Plus" component of Champion Plus can cause severe injury to sensitive crops at very low concentrations. Sprayers used to apply Champion Plus should be flushed out immediately after Champion Plus is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1 L of 3 percent ammonia per 100 L) prior to using the sprayer on sensitive crops. All nozzles, screens, and filters should be removed and cleaned after applying this product. Refer to label for detailed clean out instructions.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Compas 480EC

Herbicide Group – 6
(Refer to page 20)

Company:

Aventis CropScience

Formulation:

Compas 480 EC - 480g/L bromoxynil formulated as an emulsifiable concentrate. Container size - 9.3 L

Crop and Staging:

CROP	STAGE
Wheat Barley Oats	2 leaf to early flag leaf
Winter wheat	2 to 4 leaf (fall applications) First growth to early flag leaf (spring applications)
Corn (field or sweet)	4 to 8 leaf stage
Navigator or Bromoxynil tolerant Canola varieties only	From seedling to bolting stage

Weeds Controlled and Stages:

Broadleaf Weeds -up to 4 leaf stage unless otherwise indicated

American nightshade
bluebur
cocklebur
common ragweed
cow cockle[1]
kochia[2]
lady's-thumb
pigweed
smartweed (green or pale)
stinkweed[1]
Russian thistle[2]
wild mustard[1]

[1] Use high rate.
[2] Apply before plants are 2 inches (5cm) high

Broadleaf Weeds up to 8 leaf stage

Common groundsel
lambs'-quarters
tame buckwheat
tartary buckwheat
wild buckwheat

Rates:

Use 0.23L/acre (40 acres per jug). If weeds are beyond the leaf stages indicated, or growing under stressful conditions, use 0.28 L/acre (33 acres/jug).

Cost:

Not available in 2000.

Water Volume:

10 gallons/acre (45 L / acre)

Pressure:

275 kPa (40 psi)

Nozzles:

Flat Fan nozzles.

How it Works:

Compas 480EC is a contact herbicide. Therefore, good coverage is essential. Plants turn brown and die in 3 to 5 days.

Effects of Growing Conditions:

Avoid spraying if temperatures are greater than 25°C.

Tank Mixes:

Herbicides:

In Navigator or Bromoxynil tolerant canola varieties Compas 480EC may be tank mixed with Select at 0.08 to 0.15 L/acre for use. Add Amigo adjuvant at 0.5 L per 100 L of spray solution.

In corn - In corn, Compas 480EC may be tank mixed with Atrazine at 0.44 to 0.6 kg/acre.

Fertilizers: None.

Insectcides: None.

Fungicides: None.

Restrictions:

Rainfall: Rainfall within 1 hour of application may reduce control.

Grazing: Do not use treated crops for grazing or livestock feed or cut for forage until 30 days after application.

Recropping Interval: No restrictions the year after treatment.

Aerial Application: Registered for aerial application in wheat and barley. The use of low water volumes (2 to 4 gal/acre or 9 to 18 L/acre) may result in less effective weed control than seen with ground application.

Storage: Compas 480EC will solidify at temperatures below -20°C but will become usable again at 0°C.

Tank Cleaning:

Thoroughly clean the sprayer by flushing the system with a mixture of clean water and detergent.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts, or areas where people may frequent.

Hazard Rating:

Warning Poison

Curtail M

Herbicide Group – 4
(Refer to page 20)

Company:

Dow AgroSciences.

Formulation:

50 g/L clopyralid and 280 g/L MCPA ester formulated as an emulsifiable concentrate.

Container size - 8 L.

Crops:

Spring wheat (including durum), barley, and oats.

Weeds and Staging:

The following weeds are controlled at the 1 to 4 leaf stage unless specified:

Annual sow-thistle
Common groundsel
Dandelion[1]
Flixweed[2]
Kochia[2]
Lamb's-quarters
Redroot pigweed
Russian pigweed
Scentless chamomile[2]
Shepherd's-purse[2]
Smartweed
Stinkweed[2]
Tartary buckwheat
Volunteer canola
Volunteer sunflower
Wild buckwheat
Wild mustard

Canada thistle (season long control, some regrowth may occur in the fall)
Perennial sow-thistle (top growth control only)

After all thistles have emerged and when the majority are in the rosette to pre-bud stage.

[1] Spring rosettes only

[2] 2 to 4 leaf stage, spring seedlings.

Crop Stage:

3 leaf to just before the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Cost:

$11.50/acre (2000 suggested retail price).

Rates:

Apply at 0.80 L/acre (10 acres per 8 L container).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan nozzles tilted forward at a 45° angle.

How it Works:

Curtail M is a growth regulator type of herbicide which is absorbed through the foliage and translocated to all parts of the plant, causing undifferentiated growth which usually results in death of susceptible weeds.

Effects of Growing Conditions:

When weeds are stressed because of drought, flooding, hot or cool (less than 15°C) temperatures, weeds are not actively growing and control may be reduced. Do not apply to weeds stressed longer than 20 days from lack of moisture as poor control can result.

Tank Mixes:

In spring wheat (including durum) and barley, Curtail M at 0.80L/acre may be mixed with:

- Achieve 80 DG at 0.10 kg/acre plus Turbocharge at 0.5 L per 100L spray mixture.
- Puma^{120} Super* at 0.154 to 0.308 L/acre

In spring wheat (not including durum) and barley Curtail M* may be mixed with:

- Avenge at 1.4 to 1.7 L/acre (no adjuvant required)**
- Curtail M at 0.60 L/acre may be mixed with Refine Extra at 8g/acre plus a non-ionic surfactant at 0.2 L per 100 L spray solution.

In spring wheat (including durum), Curtail M at 0.80 L/acre may be mixed with:

- Horizon at 0.092 to 0.116 L/acre plus Score at 0.8 L per 100 L spray mixture.
- Puma Super at 0.40 L/acre (no adjuvant required).

In spring wheat (not including durum) Curtail M at 0.80 L/acre may be mixed with:

- Assert at 0.52 to 0.64 L/acre plus water pH adjuster at 1 package per jug Assert.

*- Use the 0.66 to 0.8 L/acre of Curtail M. The 0.66 L/acre rate will control light infestations of Canada thistle, flixweed (spring seedlings only), lamb's-quarters, shepherd's-purse, stinkweed, wild mustard.

** - See Avenge label for varietal restrictions. Allow a minimum of 5 days between the application of Curtail M plus Avenge and the application of any other pesticide, as poor weed control may result.

Check the label for additional crop staging restrictions.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours will reduce control.

Grazing: Do not graze treated fields within 7 days of application.

Recropping: Wheat, barley, oats, rye, corn, flax, canola, and mustard may be planted the year after application. Do not sow any other crops until the second year after application.

Aerial Application: Do not apply by air.

Storage: Store in a cool (above 5°C), dry area. If product is frozen, bring to room temperature and agitate before use.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Non-labelled crops can be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Caution Eye Irritant

Dichlorprop + 2,4-D

Herbicide Group – 4
(Refer to page 20)

Company/Products:

United Agri Products (Turboprop 600)
Nufarm (Estaprop)
IPCO (Dichlorprop-D)

Formulation:

300 g/L of dichlorprop and 282 g/L of 2,4-D ester formulated as an emulsifiable concentrate. Container size - 10 L.

Crops:

Barley, spring wheat (including durum), winter wheat.

Weeds:

Annual sow-thistle
Ball mustard
Bluebur
Burdock
Canada thistle [1]
Cocklebur
Curled dock [1]
Dog mustard
Flixweed
Hare's ear mustard
Indian mustard
Kochia
Lady's-thumb
Lamb's-quarters
Night-flowering catchfly [3]
Oak-leaved goosefoot
Perennial sow-thistle [1]
Toadflax [2]
Ragweed
Redroot pigweed
Round-leaved mallow
Russian pigweed
Russian thistle
Shepherd's-purse
Smartweed
Stinkweed
Stork's-bill
Tartary buckwheat
Tumble mustard
Volunteer canola
Volunteer sunflower
Wild buckwheat
Wild mustard
Wormseed mustard

[1] Top growth control only
[2] Suppression only
[3] Spring annuals only

Crop Stage:

Wheat (spring, durum) and barley - 4 leaf to early flag leaf.

Winter wheat - in spring after tillering but before early flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

Treat weeds when actively growing in the 2 to 4 leaf stage. Lady's-thumb, smartweed, volunteer sunflower, volunteer canola, wild buckwheat and tartary buckwheat must be treated before the 4 leaf stage. Kochia and Russian thistle must be treated before weeds are 2 inches high. Toadflax should be treated before a majority reach 6 inches in height (suppression only).

Cost:

$5.43 - $6.28/acre (2000 suggested retail price).

Rates:

0.71 L/acre (one 10 L container treats 14 acres).

Water Volume:

5 to 20 gallons/acre (25 to 90 L/acre). Use a minimum of 10 gallons/acre of water to reduce the risk of drift.

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

How it Works:

Dichlorprop and 2,4-D are systemic herbicides which are absorbed through foliage and roots and are translocated to actively growing areas within plants. Symptoms include bending and twisting of leaves and stems within 2 to 7 days, followed by browning and plant death 3 to 4 weeks after application.

Effects of Growing Conditions:

Applications made under dry conditions may result in reduced control. Crops under stress from adverse environmental conditions, such as excess moisture, frost or drought, may be injured. Best weed control when adequate soil moisture is present and warm temperatures prevail. Do not apply when daytime temperatures exceed 27°C.

Tank Mixes:

Herbicides:

	Spring Wheat (including durum)	Barley
Estaprop	Achieve 80DG, Avenge, Assert, Puma^{120} Super, Puma Super*, Horizon*	Achieve 80DG, Avenge, Assert* Puma^{120} Super,
Turboprop	Achieve 80DG, Avenge, Assert, Horizon*	Achieve 80DG, Avenge
Dichlorprop	Achieve 80DG*, Avenge, Assert*, Horizon*	Achieve 80DG, Avenge

* These combinations are only supported by the recommendations of the grass control product. Refer to the grass control product section in the Guide or the product label.

Note: Always refer to the label or the Guide section of the tank mix partner for additional restrictions on staging and varieties.

Fertilizers: None registered.

Insecticides: None registered

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Estaprop - Do not graze the treated crop or harvest for hay or feed within 40 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Dichlorprop-D/Turboprop 600 - Do not graze treated crops or cut for feed prior to crop maturity.

Recropping: No restrictions the year after application.

Aerial Application: Certain formulations may be applied by air. Refer to specific product labels for full details for application by air.

Storage: May be frozen.

Tank Cleaning:

Manufacturers of this product warn that even after thorough cleaning, the use of a sprayer that has come in contact with this product may cause damage to susceptible crops. Do not use spray equipment to apply other pesticides to crops sensitive to these products. To clean sprayer, rinse all parts several times with water, then fill sprayer with 1 L of ammonia (3 percent) per 100 L of water and let stand for 24 hours. Rinse several times after with clean water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison

Dual II Magnum

Herbicide Group – 15
(Refer to page 20)

Company:

Syngenta

Formulation:

915 g/L metolachlor formulated as an emulsifiable concentrate. Container size - 12 L.

Crops:

Corn (field, sweet, silage), soybeans, potatoes, dry beans, sweet white lupins, processing peas.

Weeds:

American nightshade
Barnyard grass
Eastern black nightshade
Fall panicum
Giant foxtail
Green foxtail
Hairy crabgrass
Old witch grass
Redroot pigweed[1]
Smooth crabgrass
Yellow foxtail
Yellow nutsedge[2]

[1] Suppression only.
[2] Preplant incorporated treatment only.

Crop Stage:

Preplant incorporated. In areas with good rainfall or under irrigation, may be applied as a pre-emergence surface treatment. When Dual II Magnum is applied after planting but prior to emergence, at least 0.5 inches of water (1.25 cm) is required within 10 days of application for proper activity.

Weed Stage:

Pre-emergence.

Cost:

$21.45 to $30.03/acre (2000 suggested retail price).

Rates:

0.5 to 0.7 L/acre (one 10 L container treats 24 to 17 acres). Use higher rates on heavy textured soils or when high populations of weeds are expected. Make only one application per season.

Water Volume:

15 gallons/acre (70 L/acre).

Pressure:

200 to 300 kPa (30 to 45 psi).

Nozzles:

Use flat fan nozzles, 50 mesh screens.

Incorporation:

Apply to a firm seed bed free of large clods or lumps. If using tandem disks, set disks to work the soil at a depth of 4 inches (10 cm) and operate at a speed of 6 km/hr (4 mph). If using an S-tine cultivator, set the implement to work the soil to a depth of 4 inches (10 cm) and operate at a speed of 10 km/hr (6 mph). Incorporation equipment should include rolling or western harrows.

How it Works:

Dual II Magnum inhibits the germination of weeds, particularly grasses.

Effects of Growing Conditions:

A moderate rainfall or equivalent irrigation is required within 10 days to activate pre-emergent surface treatments. If rain does not occur, a shallow cultivation or use of a rotary hoe is necessary. Drought conditions that persist after any application may reduce annual grass control. On sandy soils, heavy rainfall following application may cause leaching of Dual II Magnum, resulting in reduced weed control.

Tank Mixes:

Herbicides: Corn - May be tank mixed with AAtrex in both PPI and pre-emergegent applications.

Fertilizers: May be applied with liquid fertilizer. May be impregnated onto dry bulk fertilizers (except nitrate fertilizers, superphosphate fertilizers or limestone).

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: When PPI, 0.5 inches (1.25 cm) of rain is required after application for proper activity.

Grazing: Do not graze the treated immature crop or cut for hay. In corn, immature means before ear emergence.

Recropping: In the year of treatment, seed only corn, soybeans, white beans, potatoes, snap beans, lima beans, processing peas, sweet white lupins, or (a minimum of 4.5 months after application) winter cereals. If Dual II Magnum has been applied in a tank mix with another product, consult those products' labels for additional recropping restrictions.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

Spray equipment should be throughly flushed with clean water and drained after application is complete. Do not let the mixed product stand in the spray tank without agitation.

Non-labelled crops can be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

DyCleer

Herbicide Group – 4

(Refer to page 20)

Company:

Syngenta

Formulation:

480 g/L dicamba acid present as a dimethylamine salt formulated as a solution. Container size – 10 L.

Crop:

Range, pasture and non crop areas.

Weeds Controlled and Rates:

Weeds Controlled		Rate (L/acre)
Absinthe* Canada thistle* Leafy spurge*	Perennial sow-thistle* Povertyweed* Scentless chamomile*	0.5
Canada thistle Common ragweed Curled dock* English daisy False ragweed (Marsh elder)	Field bindweed Giant ragweed Goldenrod Perennial sow-thistle	0.93
Diffuse knapweed Goat's-beard Ground cherry Pasture sage	Povertyweed Sheep sorrel Thyme-leaved spurge	1.86
Baby's-breath Braken fern* Fringed sagebrush	Perennial cinquefoil spp.* Russian knapweed* Sheep-laurel	3.72

* Top-growth control only

For woody species see tank mixes.

Crop Stage:

No stage specified.

Weed Stage:

Apply to target plants that are actively growing after leaves have fully expanded. Do not apply to woody plants within 3 weeks of fall colour change. Apply only to brush less than 8 ft. (2 m) tall.

Cost:

$28.75 per L (2000 suggested retail price)

Water Volume:

Broadcast treatments: 20 to 30 gallons/acre (90 to 135 L/acre) to ensure good coverage.

Wand treatment: apply until the point of runoff.

Pressure:

Less than 40 psi (275 kPa)

How it Works:

DyCleer is a growth regulator type herbicide that is absorbed by the foliage and roots. It is a systemic herbicide that is translocated throughout the plant, causing rapid, undifferentiated growth resulting in symptoms of bending and twisting of stems and leaves. Death occurs in non-woody plants in about 2 to 3 weeks.

Effects of Growing Conditions:

Drift from DyCleer can cause severe damage to sensitive plants. Apply in the morning or the evening when temperatures are between 10° and 25°C. Do not apply when:

Winds are in excess of 8 km/hr or gusty and are blowing in the direction of sensitive non-target plants.

Daytime temperatures are expected to exceed 30°C.

Conditions of high humidity or fog are present.

Tank Mixes:

Herbicides:

Broadcast treatment:
DyCleer tank mixed with 2,4-D amine will control the following species. See label for rates.

Poison ivy
White (paper) birch
Willow

Wand treatment:
DyCleer tank mixed with 2,4-D amine or ester will control the following woody species. See label for rates.

Alder
Balsam fir
Balsam poplar
Birch
Black cottonwood
Bur oak
Cherry
Elm
Hickory
Western Snowberry
Pine
Wild rose
Wolf (silver) willow
Red oak
Sugar maple
Spruce
Tamarack
White cedar
Vine maple
White ash

Fertilizers: None

Insectcides: None

Restrictions:

Rainfall: No rainfree period specified on the label. The required interval may be up to 8 hours. Contact the manufacturer for more information.

Grazing: Restrictions on grazing and harvesting treated areas for hay are as follows

Dairy Cattle
- up to 0.5 L/acre no restriction
- 0.5 to 0.93 L/acre - wait 7 days
- 0.93 to 1.86 L/acre – wait 14 days
- 1.86 to 2.87 L/acre – wait 30 days

Meat Animals – if treated vegetation is consumed within 30 days of treatment, feed animal untreated feed for 30 days before slaughter. No restrictions if treated forage is fed 30 days after treatment.

Aerial Application: May be applied by air in a minimum of 18 gallons (85 L) per acre when wind is less than 15 km/hr and moving away from sensitive areas.

Storage: Thaw and shake well if frozen.

Environment: Do not contaminate water for irrigation or domestic consumption. Do not mix or apply in areas where the product may wash into the root zone of desirable trees or shrubs.

Tank Cleaning:

The manufacturer does not give specific instructions for cleaning spray tanks. DyCleer left in the spray tank may cause severe damage to subsequent applications to sensitive crops.

Do not clean equipment near desirable vegetation, wells, dugouts, or other water. Clean your sprayer away from areas where others are likely to walk.

Hazard Rating:

Caution - Poison

Warning - Eye irritant

DyVel

Herbicide Group – 4
(Refer to page 20)

Company:

BASF

Formulation:

84 g/L of dicamba and 336 g/L of MCPAK formulated as a solution.

Container size - 2 x 10 L jugs, 55 L, 110 L.

Crops:

Spring wheat (including durum), barley, oats, winter wheat.

Weeds and Staging:

Weeds controlled in the 2 to 4 leaf stage unless otherwise stated:

Ball mustard
Burdock
Cleavers (suppression only)
Cocklebur
Common ragweed
Corn spurry (2 to 3 leaf)
Cow cockle (2 to 3 leaf)
False ragweed
Flixweed
Giant ragweed
Green smartweed
Hare's-ear mustard
Hemp-nettle (2 to 3 leaf)
Indian mustard
Kochia
Lady's-thumb
Lamb's-quarters
Prostrate pigweed
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Tartary buckwheat
Tumble mustard
Wild buckwheat
Wild mustard
Wormseed mustard
Wild radish
Volunteer canola (2 to 4 leaf)
Volunteer sunflowers

Top growth control:
Canada thistle
Perennal sow-thistle

Crop Stage:

Spring wheat (including durum), barley or oats - 2 to 5 leaf stage. Note: Crop damage can occur if applications are made at other than the recommended crop stage.

Winter wheat - apply in spring when crop is 6 to 10 inches (15 to 25 cm) tall but before shot blade stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Cost:

$5.18/acre (2000 suggested retail price).

Rate:

0.5 L/acre (one 10 L jug treats 20 acres).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 to 310 kPa (40 to 45 psi). To reduce the risk of drift damage to sensitive non-target crops, 150 to 200 kPa (20 to 30 psi) and higher water volumes are recommended.

Nozzles:

Flat fan. Select nozzles that produce a low number of fine droplets to reduce the risk of drift.

How it Works:

DyVel is a growth regulator type herbicide that is absorbed primarily by foliage but also through plant roots. It is a systemic herbicide that is translocated throughout plants, causing rapid, undifferentiated growth and bending and twisting of stems and leaves, resulting in plant death in 2 to 3 weeks.

Effects of Growing Conditions:

For best weed control, apply when temperature is between 10 and 25°C. Do not treat crops under stress from excessive moisture or drought. To avoid crop injury, do not apply when temperature exceeds 27°C, or when there is a risk of a severe drop in nighttime temperature.

Tank Mixes:

Herbicides: For spring wheat, DyVel at 0.50 L/acre may be tank mixed with Horizon at: 0.095 L/acre for wild oat control only, or 0.115 L/acre for additional control of green and yellow foxtail.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crop within 30 days of application.

Recropping: No restrictions the year after treatment.

Aerial Application: May be applied by air. Use a minimum of 2 gallons/acre (8 L/acre) water volume.

Storage: May be frozen.

Tank Cleaning:

When finished spraying DyVel, run clean water through the tank, pump and lines. Drain and refill with clean water and 1 L of household ammonia (3 percent) per 100 L water. Circulate the solution through lines and nozzles. Scrub inside surfaces but do not enter tank. Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

DyVel DS

Herbicide Group – 4
(Refer to page 20)

Company:

BASF

Formulation:

110 g/L dicamba, 295 g/L 2,4-D amine and 80 g/L mecoprop formulated as a solution.

Container size - 2 x 10 L jugs, 55 L, 110 L.

Crops:

Barley
Corn (field and sweet)
Fall Stubble
Summerfallow
Wheat (durum, spring winter)

Weeds:

See Rates for a list of weeds controlled.

Crop Stage:

Spring wheat - 3 to 5 leaf stage. Barley - 2 to 3 leaf stage. Applications outside the recommended stage may result in crop injury.

Winter wheat - before crop is 12 inches (30 cm) tall in spring.

Corn - before corn reaches 6 inches (15 cm) in height with the top leaf extended.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

2 to 3 leaf stage.

Cleavers - apply at the 1 to 2 whorl stage. Fall stubble - Canada thistle should be treated when 6 to 8 inches (15 to 20 cm) of new growth is present.

Summerfallow - Canada thistle should be in early bud stage.

Rosette stage for winter annuals in winter wheat.

Volunteer canola - 2 to 4 leaf stage (best results prior to bolting)

Cost:

$4.32 to $5.72/acre in crop applications.
$5.73 to $9.02/acre for fall stubble and summer fallow.

(2000 suggested retail price).

Rates:

Wheat, corn - 0.34 to 0.45 L/acre (one 10 L container treats 29 to 22 acres).

Barley - 0.34 L/acre (one 10 L container treats 29 acres).

Fall stubble, summerfallow- 0.45 to 0.71 L/acre (one 10 L container treats 22 to 14 acres).

e low registered rate for each crop will control the llowing weeds:

nnual smartweed
nnual sow-thistle
cklebur
ommon ragweed
rn spurry
edge bindweed
otweed
chia
dy's-thumb
mb's-quarters
Mustards (wild, ball, tall, wormseed, yellow)
Prostrate pigweed
Redroot pigweed
Russian thistle
Stinkweed,
Volunteer canola
Volunteer tame buckwheat
Wild buckwheat

e the high registered rate for each crop to control the llowing weeds:

nada thistle
op growth control only)
eavers (suppression only)
w cockle
eld bindweed
Flixweed
Round-leaved mallow (suppression only)
Shepherd's-purse
Tartary buckwheat

e high rate for each crop should be used for all weeds der adverse growing conditions, when weeds are at an vanced stage of growth or when weed densities are gh. Guidelines are not provided for weed densities der light or heavy infestations. When in doubt as to the estation level, use the high rate or contact the manufacrer.

ater Volume:

nimum 10 gallons/acre (45 L/acre) in cereals. Corn - 20 35 gallons/acre (90 to 160 L/acre).

ressure:

) - 275 kPa (30 - 40 psi).

ozzles:

t fan.

ow it Works:

Vel DS is a growth regulator type herbicide that is abbed primarily by foliage but also through plant roots. It a systemic herbicide that is translocated throughout nts, causing rapid, undifferentiated growth and bend- and twisting of stems and leaves, resulting in plant ath in 2 to 3 weeks.

Effects of Growing Conditions:

Crops under stress from excess moisture, drought or disease may suffer a setback when this herbicide is applied. Do not apply when temperature exceeds 27°C or when relative humidity is high. Stubble treatments for thistle control in fall should be made at least 2 weeks prior to killing frost.

Do not apply DyVel DS at wind speed greater than 5 mph (8 km/hr).

Tank Mixes:

Herbicides: Corn - Atrazine
Spring wheat (not including durum) - Puma Super
Spring wheat (including durum) - Puma™ Super

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze or harvest for livestock feed within 30 days of application. Do not permit lactating dairy animals to graze fields within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Recropping: No restrictions the year after treatment.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

The manufacturer of this product warns that the use of a sprayer that has come in contact with this product may cause damage to susceptible crops. Restrict use of your sprayer to crops on which DyVel DS is registered if you have used this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison

Eclipse

Herbicide Group – 4, 9
(Refer to page 20)

Company:

Dow AgroSciences

Formulation:

Eclipse A – 360 g/L clopyralid formulated as a solution.

Eclipse B – 360 g/L glyphosate present as an isopropylamine salt and formulated as a solution.

Container size – Each case will treat 30 acres and will consist of 3 split jugs (10 acres/jug). Each split jug will contain 1.12 L of Eclipse A and 5 L of Eclipse B.

Crops:

Glyphosate tolerant (Roundup Ready) canola varieties only.

Weeds controlled:

Grasses

Green foxtail
Quackgrass[1]
Wild oat
Volunteer barley
Volunteer wheat

Broadleaf weeds:

Canada thistle[1]
Chickweed
Cleavers
Corn spurry
Cow cockle
Dandelion[2]
Hemp nettle
Kochia
Lamb's-quarters
Night-flowering catchfly
Perennial sow thistle[2]
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Wild buckwheat
Wild mustard
Volunteer canola[3]
Wild tomato

[1] season-long control
[2] suppression
[3] not including including glyphosate tolerant (Roundup Ready) varieties

Crop Stage:

Apply when canola is in the 2 to 6 leaf stage. Some yellowing may occur when applied at the 4 to 6 leaf stage. This effect is temporary and will not influence crop growth, maturity or yield.

Weed Stage:

None specified on label.

Cost:

$15.90 (2001 suggested retail price).

Rates:

Apply Eclipse A at 0.112 L/acre and Eclipse B at 0.5 L/acre or 10 acres/jug (30 acres/case). To prepare spray solution, add Eclipse A to the spray tank. Once it is half filled with water, add Eclipse B as the remaining water is added to the tank.

Water Volume:

10 gal acre (45 L/acre)

How it works:

Eclipse A is a growth regulator type herbicide which is absorbed through leaves and stems and is translocated to all parts of the plant. Symptoms include swollen growing points and roots, twisted stems and leaves, and a gradual discoloration from green to yellow to brown. Susceptible plants die in 2-3 weeks.

Eclipse B is a nonselective, systemic herbicide which moves from treated foliage into the entire plant. Symptoms include gradual wilting and yellowing of the plant advancing to complete browning of the above ground growth and deterioration of underground plant parts. Effects may not be visible for 7 to 10 days after application.

Effects of Growing Conditions:

Do not treat weeds under poor growing conditions such as drought stress, disease or insect damage, as reduced weed control may result. Control may also be reduced when treated weeds are heavily covered with dust.

Tank Mixes:

Herbicides: None registered

Fertilizers: None registered

Insecticides: None registered

Restrictions:

Rainfall: Heavy rainfall immediately after application may wash the chemical off the foliage. Do not apply if rainfall is forecast for the time of application.

Grazing: Allow 3 to 5 days before grazing treated areas.

Recropping: Wheat, oats, barley, rye (not underseeded to legumes such as alfalfa and clover), forage grasses, flax, canola and mustard can be grown the year after application.

Aerial application: Do not apply by air.

Storage: Store in heated storage; if products are frozen, bring to room temperature and agitate before use.

Tank Cleaning:

Flush sprayer and parts with water immediately after use.

Hazard Rating:

Eclipse A- Caution Poison

Eclipse B- Skin and Eye Irritant

Edge

Herbicide Group – 3

(Refer to page 20)

Company:

Dow AgroSciences

Formulation:

Edge DC* - 60 percent ethalfluralin formulated as a dispersible concentrate. Container size - 20 x 0.75 kg water oluble packets.

*Edge DC has been discontinued by the manufacturer and imited supplies remain.

Edge Granular - 5 percent ethalfluralin formulated as a granular. Container size - 25 kg or 544 kg.

Crops:

Canola
Caraway
Coriander
Dry beans (white or kidney)
ababeans
entils
(fall application only)
Mustard (yellow only)
Peas
Safflower
Seedling alfalfa
(seed production only)
Soybeans
Sunflowers

Weeds:

Grasses Controlled:
Wild oats
Yellow foxtail
Barnyard grass
Green foxtail
Volunteer spring wheat

Broadleaf Weeds Controlled:
Chickweed
Redroot pigweed
Purslane
Cow cockle
Corn spurry
Lamb's-quarters
Prostrate pigweed
Wild buckwheat
Kochia

Weeds Suppressed:
Volunteer barley
Russian thistle
Nightshade
Lady's-thumb
Hemp-nettle
Cleavers

Rates:

PRODUCT/ TIME OF APPLICATION	RATE (KG/ACRE)				
	LIGHT TEXTURED SOILS		MEDIUM TO HEAVY TEXTURED SOILS		
	2-6% Organic Matter/Dark Brown-Black	6-15% Organic Matter Deep Black	2-4% Organic Matter Dark Brown	4-6% Organic Matter Black	6-15% Organic Matter Deep Black
Spring Edge DC	0.57	0.77	0.57	0.77	0.77 - 0.93
Spring Edge Granular	6.9	8.9	6.9	8.9	8.9 - 11.3
Fall Edge Granular	8.9	11.3	8.9	11.3	11.3

[1] To conserve crop residue one incorporation may be completed in the fall and the second incorporation completed in the spring prior to planting.

Edge DC is registered for fall application, however it is not recommended where the required incorporation leaves soil vulnerable to wind and water erosion. Do not apply Edge to peat soils, soils containing less than 2 percent organic matter or soils containing greater than 15 percent organic matter. Application to eroded knolls or grey-wooded soils with highly variable texture or organic matter may result in reduced crop stand, delayed development or reduced yields in either the treated or rotational crop. To reduce the possibility of injury to the treated crop, use good quality certified seed. Seed shallow into a warm, moist, firm seedbed using recommended agronomic practices that will promote rapid and even crop germination and emergence.

Special instructions for lentils:
Edge is registered for use on lentils for fall application only. One incorporation must be completed in the fall. Seeding depth is critical - do not seed more than 1.5 inches (4 cm) deep. Avoid loose seedbeds and planting into cold soils.

Crop Stage:

Preplant incorporated.

Weed Stage:

Pre-emergence.

Cost:

$14.87 to $24.27/acre (Edge DC)
$13.80 to $22.60/acre (Edge Granular)
(2000 suggested retail prices).

Water Volume:

10 gallons/acre (45 L/acre) - (Edge DC only).

Pressure:

Edge DC - 250 to 275 kPa (35 to 40 psi).

Equipment and Nozzles:

Apply Edge DC using a ground sprayer. The sprayer must be equipped with a jet, sparge or mechanical agitator. Return line agitation is not sufficient to keep the product in suspension. Use 16 mesh screens in the agitation cycle, 50 mesh screens at the nozzles.

Apply Edge Granular using a calibrated granular applicator.

Mixing:

Edge DC - Fill the tank one third full with clean water and begin agitation. Add all of the required Edge DC packets directly into the spray tank. Continue agitation. Wait 10 minutes, then continue filling the tank with water. Prior to spraying, wait 5 more minutes with agitation running after filling is complete.

Incorporation:

Two incorporations are required at right angles for thorough mixing. The first incorporation must be completed within 24 hours of application. When using Edge DC, the second incorporation may be done immediately after the first. When using the granular formulation, delay the second incorporation for at least three days after the first. If applying Edge granular in the fall, it is preferred that both incorporations be done in the fall. The second incorporation may be delayed until spring to conserve trash; however, both incorporations must be done to the same depth.

Incorporate with a tandem disk, disker or field cultivator (Vibrashank type). A Vibrashank type cultivator should have 3 to 4 rows of sweeps spaced 8 inches apart and staggered so that no soil is left unturned. Set equipment to work at a depth of 3 to 4 inches (8 to 10 cm). Operate disk implements at 4 to 6 mph (7 to 10 km/hr), cultivators at 6 to 8 mph (10 to 13 km/hr).

How it Works:

Edge inhibits growth of root and shoot tips as weeds germinate and begin to emerge. If the shoot portion of affected plants escapes to the soil surface, lateral and secondary root growth continues to be inhibited, which may result in a less competitive plant.

Effects of Growing Conditions:

Crops stressed by cold weather, excessive moisture or drought may be injured by Edge. Dry soil conditions between application and emergence may result in decreased weed control.

Tank Mixes:

Herbicides: Edge DC may be tank mixed with Sencor for use on peas and fababeans. Add Edge DC to the tank first. Ensure that the soluble packaging has completely dissolved prior to adding the Sencor.

Fertilizers: Do not mix Edge DC with liquid fertilizer.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No effect once incorporated.

Grazing: Do not graze or cut treated crops for livestock feed prior to crop maturity.

Recropping: Red beets, oats, canaryseed and small-seeded grasses may be affected the year after treatment. Damage to wheat may occur if the crop is seeded onto land that has been treated with broadleaf weed control rates of trifluralin or Edge for 2 consecutive crop years. Thinning of crop may occur in areas that have received abnormally low amounts of precipitation or in crops that are emerging slowly.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. Edge Granular may be frozen. Do not freeze Edge DC. Do not expose to prolonged sunlight or heat.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make a recommendation.

Non-labelled crops may be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Embutox 625/Cobutox 600/Caliber 400

See 2,4-DB page 47.

Eptam 8-E

Herbicide Group – 8
(Refer to page 20)

Company:

Syngenta

Formulation:

800 g/L of EPTC formulated as an emulsifiable concentrate. Container size - 10 L.

Caution:

The level of weed control will be reduced where Eptam 8-E is used on soils that have been treated with Eradicane or Eptam 8-E the previous growing season. It is expected that the reduction in control will be greater where Eradicane or Eptam 8-E have been used repeatedly for 2 or more years.

Crops:

Dry beans
Flax
Potatoes
Seedling alfalfa
(seed production only)
Seedling bird's-foot trefoil
(seed production only)
Sunflowers.

NOTE: The use of Eptam 8-E on flax is not recommended in Saskatchewan because of the risk of crop injury.

Weeds:

Barnyard grass
Chickweed
Corn spurry
Green foxtail
Hairy nightshade
Henbit
Lamb's-quarters
Nettleleaf goosefoot
Purslane
Pigweed (prostrate, redroot, tumble)
Volunteer cereals (wheat, barley, oats)
Yellow foxtail
Yellow nutsedge

Crop Stage:

Preplant incorporated.

Weed Stage:

Pre-emergence.

Cost:

Field crops: $15.26 to $23.97/acre
Potatoes: $18.49 to $36.98/acre
(2000 suggested retail prices).

Rates:

CROP	RATE (L/ACRE)	ACRES TREATED PER 10 L CONTAINER
Dry and snap beans	1.72 - 2.23	5.8 - 4.5
Seedling alfalfa, seedling bird's-foot trefoil, sunflowers	1.72	5.8
Potatoes	1.72 - 3.44	5.8 - 2.9
Flax	1.42 - 1.72	7.0 - 5.8

Where a rate range appears, use the lower rate on light textured soils and the higher rate on heavy textured soils. Do not use on soils with less than 3 percent organic matter or more than 15 percent organic matter.

Water Volume:

Minimum of 10 gallons/acre (45 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi).

Equipment and Nozzles:

Since Eptam 8-E is highly volatile, the product must be incorporated immediately. This is best accomplished by mounting spraying equipment directly onto the incorporation equipment (tandem disks, field cultivators on light soil).

Incorporation:

All growth and stubble should be thoroughly worked into the soil before treatment. Apply to a dry soil surface. Incorporate immediately after application preferably during the spraying operation as Eptam 8-E is volatile. Set disc and cultivator implements to cut to a depth of 4 to 6 inches (10 to 15 cm). A second operation at a right angle to the first is required. The disc or cultivator must be followed with a harrow or other levelling device that extends beyond the width of the implement. Speeds in excess of 5 mph (8 km/h) will result in excessive pulverization and trash destruction leaving the field susceptible to erosion. The maximum recommended tillage depth is 4 inches (10 cm).

How it Works:

Eptam is absorbed by roots and coleoptiles of emerging grass weeds, and through the hypocotyl "hook" of emerging broadleaf weeds. Weeds are killed before they emerge.

Effects of Growing Conditions:

Crop injury can occur if stressful environmental conditions (cold, wet soils, drought or excessive heat) prevail after seeding. To minimize crop injury, delay seeding 10 days if these conditions prevail at the time of application, or select an alternative product. Very cold or dry soil conditions during weed emergence will reduce control.

Tank Mixes:

Herbicides: Potatoes - Eptam 8-E may be tank mixed with Sencor 75 DF. Do not use on red skinned potatoes, early varieties or on Belleisle, Tobique, or Shepody varieties. Do not use on soils with greater than 7 percent or less than 2 percent organic matter. Refer to Sencor for cropping restrictions and specific rate information.

Dry beans (white and red kidney only) - Eptam 8-E may be tank mixed with liquid formulations of Treflan and Rival.

Fertilizers: May be mixed with liquid fertilizer. Compatibility test should be conducted according to instructions on the herbicide label. Dry bulk fertilizers, except nitrate fertilizers, may be impregnated or coated with Eptam 8-E. The impregnated fertilizer should be spread uniformly onto the field using a double overlap pattern immediately after impregnation. The impregnated fertilizer must be applied to the field when the soil surface is dry to at least 1/2 inch (1.5 cm) depth. The first incorporation must be done immediately after application.

Insecticides: Do not tank mix with insecticides.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No effect once incorporated.

Grazing: Do not graze or feed treated crops to livestock.

Recropping: Will not injure crops the year after spring application.

Aerial Application: No labelled restrictions. However, since this product must be incorporated within seconds of application, aerial applications are impractical.

Storage: May be frozen.

Environment: Do not apply within 15 m of fish bearing waters or wildlife habitat.

Soil Type: Do not use on soils with less than 3 percent organic matter as crop injury will result.

Tank Cleaning:

The manufacturer does not provide enough label information on tank cleaning to make a recommendation. Contact the manufacturer for tank cleaning instructions.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Eradicane 8-E

Herbicide Group – 8
(Refer to page 20)

Company:
Syngenta

Formulation:
800 g/L of EPTC (plus safener) formulated as an emulsifiable concentrate.

Container size - 10 L.

Caution:
The level of weed control will be reduced where Eradicane 8-E is used on soils that have been treated with Eradicane 8-E or Eptam 8-E the previous growing season. It is expected that the reduction in control will be greater where Eradicane 8-E or Eptam 8-E has been used repeatedly for 2 or more years.

Crops:
Corn (field and silage).

Weeds:
- Barnyard grass
- Chickweed
- Corn spurry
- Green foxtail
- Hairy nightshade
- Henbit
- Lamb's-quarters
- Pigweed (prostrate, redroot, tumble)
- Purslane
- Quackgrass (suppression)
- Volunteer cereals (wheat, barley, oats)
- Wild oats
- Yellow nutsedge
- Yellow foxtail

Rates:

USE	RATE (L/ACRE)	ACRES TREATED PER 10 L CONTAINER
Annual weed control in light textured soils	1.72	5.8
Annual weed control in heavy textured soils	2.23	4.5
Quackgrass suppression	3.44	2.9

Crop Stage:
Preplant incorporated.

Weed Stage:
Pre-emergence.

Cost:
$17.54 to $35.08/acre (2000 suggested retail price).

Water Volume:
Minimum of 10 gallons/acre (45 L/acre).

Pressure:
200 to 275 kPa (30 to 40 psi).

Equipment and Nozzles:
Since Eradicane 8-E is highly volatile, the product must be incorporated immediately. This is best accomplished by mounting spraying equipment directly onto the incorporation equipment (tandem disks, field cultivators on light soil).

Incorporation:
All growth and stubble should be thoroughly worked into the soil before treatment. Apply to a dry soil surface. Incorporate immediately after application, preferably during the spraying operation, as Eradicane 8-E is volatile. Set disc and cultivator implements to cut to a depth of 4 to 6 inches (10 to 15 cm). A second operation at a right angle to the first is required. The disc or cultivator must be followed with a harrow or other levelling device that extends beyond the width of the implement.

How it Works:
Eradicane is absorbed by roots and coleoptiles of emerging grass weeds, and through the hypocotyl "hook" of emerging broadleaf weeds. Weeds are killed before they emerge.

Effects of Growing Conditions:
Poor weed control may result if soils are wet during incorporation.

Crop injury may result if soil is cold and wet during germination and emergence. Hot, dry conditions during germination and early crop growth may also lead to crop injury.

Tank Mixes:

Herbicides: Eradicane 8-E may be mixed with Bladex or with Atrazine.

Fertilizers: Dry bulk fertilizers, except nitrate fertilizers, may be impregnated or coated with Eradicane 8-E. The impregnated fertilizer should be spread uniformly onto the field using a double overlap pattern immediately after impregnation. The impregnated fertilizer must be applied to the field when the soil surface is dry to at least 1/2 inch (1.5 cm) depth. The first incorporation must be done immediately after application.

May also be mixed with liquid fertilizer. Conduct a compatibility test prior to mixing in tank. See label for instructions on conducting a compatibility test.

Insecticides: Do not tank mix with insecticides.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No effect once incorporated.

Grazing: Do not graze treated crops or cut for feed prior to ear emergence.

Recropping: Will not injure crops the year after spring application.

Aerial Application: No labelled restrictions, however, since this product must be incorporated within seconds of application, aerial applications are impractical.

Storage: May be frozen.

Tank Cleaning:

The manufacturer does not provide enough label information on tank cleaning to make a recommendation.

Non-labelled crops may be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Escort

Herbicide Group – 2

(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

60 percent metsulfuron methyl formulated as a dry flowable. Container size - 0.25 kg.

Crops:

Pasture, rough turf, rangeland, and non-crop areas.

Weeds Controlled and Rates:

Rate	Weeds Controlled	
8 g/acre	Canada thistle[1] Dandelion[1] Russian thistle Sow-thistle[1]	Common tansy Kochia Scentless chamomile Sweet Clover
10 g/acre	Above weeds plus: Canada thistle[1] Sow-thistle[1]	 Dandelion[1] Western snowberry
12 g/acre	Above weeds plus: Wild rose Canada thistle[1]	 Dandelion Sow-thistle[1]

At all rates add Agral 90, Agsurf, or Citowett at 0.2 L per 100 L of spray solution.

[1] Suppression only.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Crop Stage:

No restrictions on crop stage.

Weed Stage:

For seedling weeds apply to young plants up to 4 inches (10 cm) tall or wide. For established non-woody plants (biennial or perennial) apply up to the early bud stage. For western snowberry and wild rose apply between mid-June and mid August after the brush has leafed out, but before the leaves begin to turn their fall colours.

Cost:

$14.00 to $21.00/acre (2000 suggested retail price).

Water Volume:

10 to 20 gallons/acre (45 to 90 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan.

How it Works:

Escort is absorbed by leaves and roots, and rapidly stops growth of susceptible weeds. Discoloration is visible in 1 to 3 weeks.

Effects of Growing Conditions:

Do not apply during periods of intense rainfall or to soil saturated with water. Warm, moist conditions following treatment enhance the activity of Escort, while cold, dry conditions may reduce or delay activity. Brush hardened off by cold weather and drought stress may not be controlled.

Tank Mixes:

Herbicides: 2,4-D amine or ester at 0.79 L/acre (500 g/L formulations) plus surfactant.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: May be grazed on the day of treatment.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. May be frozen.

Tank Cleaning:

Escort can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Escort should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with 1 L of 3 percent household ammonia per 100 L of water. All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Eye Irritant

Estaprop/Turboprop 600/Dichlorprop-D

See Dichlorprop +2,4-D page 93

Everest

Herbicide Group – 2
(Refer to page 20)

Company:

Bayer Inc.

Formulation:

70% flucarbazone-sodium formulated as a water dispersible granule. Container size - 4 x 174 g water soluble packets.

Crop:

Spring wheat (NOT including durum).

Weeds Controlled:

Green foxtail Wild oat

Crop Stage:

Apply at 1 leaf to a maximum of 4 main stem leaves plus 2 tillers (6 total leaves).

Weed Stage:

Apply at 1 leaf to a maximum of 4 main stem leaves plus 2 tillers (6 total leaves).

Cost:

$14.75/acre, not including adjuvant. (2000 suggested retail price)

Rates:

17.4 g/acre (One packet treats 10 acres). Add Agral 90 or Agsurf at 0.25 L per 100 L of spray solution. Everest must be tank mixed with a broadleaf partner.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre)

Pressure:

200 to 345 kPa (30 to 50 psi)

Nozzles:

Flat Fan nozzles at 80° or 110°. Use of flood-jet or controlled droplet application equipment is not recommended.

How it Works:

Flucarbazone-sodium is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing points of the plant. Growth of susceptible plants stops soon after application. Symptoms include discoloration (yellowing, and eventually dark green) and complete control may take 2 to 3 weeks.

Effects of Growing Conditions:

Crop tolerance and weed control may be reduced if applications are made to plants growing under stress. Stress includes saturated or water-logged soil, drought, extreme temperatures, low fertility or visible disease symptoms at application.

Tank Mixes:

Herbicides:

2,4-D Amine or Ester at recommended rates up to 0.45 L/acre (500 g/L formulation)
Ally at 2 to 3 g/acre + 2,4-D amine at recommended rates up to 0.45 L/acre (500 g/L formulation)[1]
Buctril M at 0.4 L/acre
Estaprop at 0.71 L/acre
MCPA Amine or Ester at recommended rates up to 0.45 L/acre (500 g/L formulation)
Refine Extra at 8 g/acre + 2,4-D amine at recommended rates up to 0.45 L/acre (500 g/L formulation)[1]
Target at 0.4 to 0.6 L/acre[2]
Thumper 0.4 L/acre
Unity 40 acres per case[1]

[1] For the marked products add only that adjuvant recommended in the "Rates" section above.

[2] Wild oat control may be reduced in this tank mix.

Fertilizers: Do not use liquid fertilizer or products that contain boron or free chlorine with this product or water-soluble bags will become insoluble and potentially plug sprayers.

Insecticides: None

Restrictions:

Rainfall: Rainfall within 6 hours of application may reduce control.

Grazing: Do not graze treated fields. Mature grain or straw may be fed to livestock.

Pre-harvest interval: 80 days.

Recropping Interval: In Brown soils seed only spring wheat the year after application. In Black, Dark Brown, or Grey-Wooded soils spring wheat, barley, canola, and field pea may be seeded.

Aerial Application: Do not apply by air.

Storage: Store in closed original container in a cool, dry area away from fertilizers, food or feed. Handle frozen solupaks with care since they may be fragile at low temperatures.

Environment: Do not mix or load within 10 m of well heads, sloughs, dugouts, ponds, marshes, ditches, streams, lakes ,etc. Leave an unsprayed area of at least 20 m between treated areas and sensitive plants like shelterbelts and woodlots and at least 35 m between treated areas and well heads, sloughs, dugouts, ponds, marshes, ditches, streams, lakes, etc. Avoid drift onto sensitive crops like canola and tame oat.

Tank Cleaning:

Spray equipment must be thoroughly cleaned to remove traces of herbicide that might injure other crops to be sprayed. Drain any remaining spray solution from the tank and pay special attention to any deposits. Fill the tank with clean water, adding household ammonia (3%) at 1 L per 100 L. Cycle this mixture through the equipment (minimum 15 minutes) and spray out. Fill the spray tank with clean water and cycle for five minutes. Clean pump and nozzle screens thoroughly in ammonia + water solution as above. Re-install nozzles and repeat entire rinsing procedure. Wash any spilled spray mixture from the outside of the spray tank, nozzles and other machinery exposed while spraying.

Follow any additional cleaning instructions for broadleaf tank mix partners.

Do not clean equipment near desirable vegetation, wells, dugouts, or other water. Clean your sprayer away from areas where others are likely to walk.

Hazard Rating:

Keep out of reach of children

Express Pack

Herbicide Group – 2,4
(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

The Express Pack package contains 2 containers: 1 labelled Express herbicide and 1 labelled 2,4-D herbicide.

Express herbicide contains 75 percent tribenuron methyl, formulated as a dry flowable. Container size - 160 grams.

2,4-D herbicide contains 660 g/L 2,4-D LV ester, formulated as an emulsifiable concentrate. Container size - 10 L.

Crops:

Wheat (spring and durum), barley and summerfallow.

Weeds and Staging:

Weeds Controlled when treated at less than 4 inches (10 cm) tall or across, unless otherwise indicated.:

Annual sunflower
Ball mustard
Canada thistle[1]
Cow cockle
Flixweed[2]
Hare's-ear mustard
Indian mustard
Kochia (2 to 10 leaf)
Lamb's-quarters
Narrow-leaved hawk's beard[2]
Prickly lettuce
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's-purse[2]
Stinkweed[2]
Sweet clover
Thyme-leaved spurge
Tumble mustard
Wild mustard
Wild radish
Wormseed mustard

[1] Top growth control
[2] Fall rosettes and spring seedlings

Weeds Suppressed:
Wild buckwheat (1 to 3 leaf)

Crop Stage:

3 leaf to flag leaf.

Cost:

$4.18/acre (2000 suggested retail price).

Rate:

4 g/acre Express plus 0.24 L/acre 2,4-D.

The Express Pack case will treat 40 acres.

Express may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

210 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan nozzles with 50 mesh (or coarser) line strainers and screens.

How it Works:

Express rapidly inhibits the growth of susceptible weeds. Discoloration and death of weeds should be visible in 1 to 3 weeks.

Effects of Growing Conditions:

Do not apply to wheat, durum or barley that are stressed by severe weather conditions (frost, drought or water saturated soil, extreme heat), as crop injury may result. Under certain conditions (such as heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures), lightening in crop colour and reduction in crop height may occur.

Tank Mixes:

Herbicides: Express must be tank mixed with 2,4-D ester. Do not use Express alone.

In spring wheat and barley, Express Pack may be tank mixed with Assert.

In spring wheat only, Express Pack may be tank mixed with Accord.

Adding ingredients in the correct order is critical for optimum performance. Check product labels for directions. General guidelines can be found on page 13.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within 6 hours will reduce control.

Grazing: Do not graze or feed to livestock within 7 days of application.

Preharvest: Do not harvest forage or cut for hay within 30 days of application.

Recropping: No restrictions the year after treatment. Canola, flax, lentils and alfalfa may be planted 2 months after an application of Express Pack.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. May be frozen.

Tank Cleaning:

Express can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Express should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water-household ammonia rinse (1 L of 3% ammonia per 100 L of water). All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison

FlaxMax Ultra

Herbicide Group – 1, 4
(Refer to page 20)

Company:

BASF

Formulation:

Poast Ultra - 450 g/L of sethoxydim formulated as an emulsifiable concentrate.

FlaxMax - 50 g/L clopyralid and 280 g/L MCPA ester formulated as an emulsifiable concentrate.

One case of FlaxMax Ultra contains one 3.65 L container of Poast Ultra, two 8.1 L containers of FlaxMax, and one 8.1 L container of Merge.

Crops:

Flax.

Crop Stage:

Apply to flax that is 2 to 6 inches (5 to 15 cm) in height. Spraying at an early stage will reduce the risk of crop injury.

Cost:

$18.64 to $25.17/acre (2000 suggested retail price).

Weeds, Staging and Use Rates:

Poast Ultra at 0.13 L/acre, Flaxmax at 0.61 L/acre, and Merge at 0.3 L/acre (27 acres per case) will control the following weeds:			
Annual Grasses 1 to 6 leaf stage	**Annual Grasses 1 to 4 leaf stage**	**Annual Broadleaf Weeds 2 to 4 leaf stage**	**Perennial Weeds**
Barnyard grass, crabgrass, fall panicum, Persian darnel, proso millet, volunteer corn, green and yellow foxtail, witch grass	wild oat, volunteer barley, volunteer wheat	flixweed, lamb's-quarters shepherd's-purse stinkweed, volunteer sunflower, wild mustard	Canada thistle*
Poast Ultra at 0.19 L/acre, Flaxmax at 0.81 L/acre, and Merge at 0.4 L/acre (20 acres per case) will control the weeds listed above plus:			
wild oat, volunteer barley, volunteer wheat		annual sow-thistle common groundsel, redroot pigweed, Russian pigweed, scentless chamomile, smartweed, tartary buckwheat, volunteer canola, wild buckwheat	dandelion**, perennial sow-thistle*** Canada thistle

* Apply from 10 cm until early bud stage. This treatment will provide season long control of light Canada thistle infestations with some regrowth in the fall.

** Apply at the spring rosette stage.

*** Top-growth control only.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

240 to 275 kPa (35 to 40 psi).

How it Works:

The Poast Ultra component of FlaxMax Ultra is a systemic and a contact herbicide. It is absorbed through treated leaves and translocated to growing points. Susceptible grassy weeds turn yellow and then brown, with plant death occurring in 7 to 21 days. Clopyralid and MCPA (the FlaxMax component of FlaxMax Ultra) are growth regulator type herbicides which are systemic and are translocated to all parts of plants, causing rapid, undifferentiated growth in susceptible weeds. Epinasty (twisting and bending of leaves and stems) is apparent 2 to 3 days after application, with plant death occurring in 2 to 3 weeks.

Nozzles:

Flat fan nozzles tilted forward at an angle of 45°.

Effects of Growing Conditions:

When weeds are stressed because of drought, flooding or prolonged hot or cool temperatures (15°C or less), control can be reduced or delayed since weeds are not actively growing. Weed escapes may occur under prolonged stress conditions or low fertility. Do not apply to weeds stressed longer than 20 days because of lack of moisture as unsatisfactory control can result. Do not apply to crops that are under stress from heat, drought, or cool conditions as crop injury may result.

Tank Mixes:

Herbicides: None registered.

Insecticides: None registered.

Fertilizers: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within six hours may reduce control.

Grazing: Do not graze the treated crop or cut for livestock feed.

Recropping: FlaxMax Ultra residues in the soil may affect subsequent crops. Leave a minimum of 14 days between application of FlaxMax Ultra and replanting of barley, wheat, oat, and flax. Cultivating to a minimum depth of 4 inches (10 cm) is recommended before reseeding. Wheat, barley, oat, rye, corn, flax, canola or mustard may be planted the year after application. Do not seed any other crop until 2 years after application.

Preharvest: Do not apply within 60 days of harvest.

Aerial Application: Do not apply by air.

Storage: Store above 5°C. If frozen, bring to room temperature and agitate before use.

Tank Cleaning:

When finished spraying FlaxMax Ultra, run clean water through the tank, pump and lines. Drain. Refill sprayer with clean water and 1 L of household ammonia (3%) per 100 L of water. Circulate the solution through lines and nozzles. Let solution sit in the tank for several hours (preferably overnight). Scrub inside surfaces of tank, but do not enter the spray tank. Flush sprayer system with water until thoroughly clean. Remove and clean nozzles and screens.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison
Warning Eye Irritant
Warning Skin Irritant

Fortress

Herbicide Group – 3,8
(Refer to page 20)

Company:

Monsanto Canada Inc.

Formulation:

10 percent triallate and 4 percent trifluralin formulated as a granular.

Container size - 22.7 kg bag, 454 kg container.

Crops:

Wheat (spring and durum), barley, canola, flax (not including Solin-low linolenic varieties), mustard.

Weeds:

Control of wild oats, green foxtail, yellow foxtail.

Suppression of lamb's-quarters, kochia, redroot pigweed, Russian thistle, wild buckwheat.

Crop Stage:

Apply preplant incorporated in fall after September 15 until soil freeze-up or in the spring prior to seeding crop.

Surface application: Apply in the fall after October 1 and when soil temperature is less than 4°C at a 2 inch (5 cm) depth and delay incorporation until the following spring. Do not apply to fields with heavy trash cover or after snow has fallen. Some wheat or barley injury may be noted on eroded knolls.

Weed Stage:

Pre-emergence.

Cost:

$13.53 to $20.92/acre (2000 suggested retail price).

Rates:

Apply Fortress according to soil organic matter content.

ORGANIC MATTER	RATE (KG/ACRE)					
	RAPESEED (CANOLA), FLAX, MUSTARD		BARLEY		SPRING WHEAT AND DURUM WHEAT	
	Spring	Fall	Spring	Fall	Spring	Fall
< 2%	5.67	5.67	N.R.*	4.45	N.R.*	N.R.*
2 - 4%	5.67	5.67	4.45	5.67	N.R.*	4.45
4 - 6%	6.88	5.67	5.67	5.67	4.45	5.67
> 6%	6.88	6.88	6.88	6.88	5.67	5.67[1]

*N.R. - Not Recommended.

[1] For fall incorporated applications (not surface) apply 6.88 kg/acre when organic matter exceeds 8 percent.

Application:

Fortress may be applied in the fall with or without a fall tillage operation, or in the spring as a preplant incorporated treatment. Before application of this product, the soil must be in good working condition. Application to a field that is wet, lumpy, rough or ridged will result in reduced weed control and promote crop thinning.

Fall Surface Application: Where fields are prone to water and/or wind erosion, and tillage is therefore undesirable, fall surface application should be made when the soil begins to cool (less than 4°C) and within 3 weeks of soil freeze-up, which usually occurs by October 1. Application can be made to standing stubble or to previously worked fields with incorporation delayed until spring. For best results on heavy wild oat infestations, use the incorporated treatment.

Fall Incorporated Application: Fortress must be applied after September 15 and before soil freeze-up. Application prior to September 15 may result in reduced weed control. An incorporation may be completed within 24 hours of application. The second incorporation may be done in the fall (prior to soil freeze-up) or in the spring prior to, or after, seeding. If performed after seeding, it must be completed with harrows prior to emergence of the crop. Fall incorporation is not recommended on soils where a lack of trash cover combined with the required incorporation operation could result in soil erosion.

Spring Application: Fortress can be applied before seeding but must be incorporated within 24 hours of application. The second incorporation must be delayed at least 48 hours after the first and may be performed at any time prior to crop emergence.

Incorporation:

Fortress applications require two incorporations, with the second incorporation at right angles to the first. Seeding with a seeder that provides soil disturbance equivalent to a cultivator may replace one incorporation. Incorporate to a maximum depth of 2 inches (5 cm) by setting disk or cultivator implements to cut a maximum of 3 inches (7.5 cm) into the soil. Mixing the product to greater depths will dilute the herbicide, decrease wild oat control, and may cause injury to cereals. If the second incorporation is conducted after seeding, it should be done with harrows or other suitable tillage equipment adjusted so as not to disturb the seed. Harrowing does not provide effective incorporation if compact soil prevents penetration of harrow teeth, if trash accumulates in the harrow sections, or if the harrows bounce.

Seeding Requirements:

Accurate seeding depth control is critical. Thinning of wheat and barley has been known to occur when seeding depth has been inadequate. Ensure that cereals are seeded below the treated layer (2 to 3 inches or 5 to 7.5 cm). Do not seed deeper than 3 inches (7.5 cm). To ensure an even crop stand, increase the usual seeding rate of wheat or barley by 10 percent, especially if soil conditions are cold or dry. See product label for more information.

How it Works:

Triallate is absorbed by wild oat shoots, and trifluralin is absorbed by foxtail roots and shoots. Weeds usually die before emergence. If foxtail plants emerge, root growth continues to be inhibited, resulting in a less competitive plant.

Effects of Growing Conditions:

Crop injury can occur on fields where Fortress has been applied and heavy rainfall or cold weather occur after seeding but prior to crop emergence. Seeding under warm soil conditions (greater than 10°C and generally after May 15) will ensure optimum crop germination and emergence and will reduce the risk of crop injury. Very dry conditions in spring or prolonged cool soil temperatures at time of wild oat germination will result in reduced control.

Poor results may be expected from incomplete incorporation due to wet, cloddy soil or heavy trash. Ridges left at seeding may disrupt the treated layer and allow weed escapes.

Restrictions:

Rainfall: Moisture is required for activation. Rainfall of at least 0.6 inches (1.5 cm) within 2 weeks of seeding is required to ensure optimum results.

Grazing: Do not graze or cut treated crops for livestock feed prior to crop maturity.

Recropping: Fortress will leave a residue in the soil. Oats, canaryseed, and small seeded forage grasses may be injured if planted within 24 months of application. Do not apply Fortress on land to be sown to wheat if the land has been treated with trifluralin since June 1 of the previous year.

Aerial Application: May be applied by airplane with attachments designed for applying low volumes of granules.

Storage: Store in a cool, dry place.

Hazard Rating:

Skin and Eye Irritant

Freedom Gold

Herbicide Group – 1, 2

(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

Freedom Gold contains 2 components in each case:
Freedom – 75 percent thifensulfuron methyl as a water dispersible granule.
Container size – 1 x 320 g

Assure II – 96 g/L quizalofop-p-ethyl as an emulsifiable concentrate.
Container size – 1 x 8 L

Sure-mix adjuvant. Container size – 1 x 8 L

Crop:

CLEARFIELD (Imidazolinone tolerant) canola varieties 45A71, 46A73, 46A74, 46A76 only.

Application of Freedom Gold to canola varieties without the CLEARFIELD trait will result in crop death.

Application of Freedom and Assure II together as a tank mix may result in temporary crop yellowing or delay in flowering. See crop stage section for more details.

Weeds Controlled:

Grasses:
Barnyard grass
Green foxtail
Quack grass[1]
Volunteer barley
Volunteer corn
Volunteer oat
Volunteer wheat
Wild oat

Broadleaf Weeds:
Chickweed
Corn spurry
Cow cockle
Green smartweed
Hemp-nettle
Kochia[1]
Lady's-thumb
Lamb's-quarters
Redroot-pigweed
Russian thistle
Stinkweed
Volunteer canola/rapeseed
  (except CLEARFIELD varieties)
Wild buckwheat
Wild mustard

[1] Suppression only

Crop Stage:

Freedom – 3 to 6 leaf stage prior to bolting. Do not apply before the 3 leaf stage. Application to crops prior to this stage, or with uneven germination, may result in crop injury.

Caution: Testing on 46A76 has shown that to maximize crop tolerance, do NOT apply prior to the 4 leaf stage.

Assure II – No leaf stage restrictions but must be applied more than 74 days prior to harvest. Assure II plus Sure-Mix may be applied prior to the 3 leaf stage. A follow up treatment of Freedom plus non-ionic surfactant may be applied after the 3 leaf stage.

Weed Stage:

Barnyard grass, green foxtail, volunteer barley, volunteer oat, volunteer wheat - 2 leaf to early tillering

Volunteer corn, quack grass (suppression) – 2 to 6 leaf stage

Wild oat, Volunteer oat – 1 to 5 leaf with no tillers at 0.15 L/acre of Assure II; 2 to early tillering at 0.20 L/acre of Assure II. Best results when applications made prior to tillering.

Broadleaf weeds – up to 10 cm (4 inches) tall with the following exceptions:

Chickweed – 1 to 6 leaf stage with good coverage
Wild buckwheat – 1 to 3 leaf stage

Cost:

$21.95 per acre, including adjuvant (2000 suggested retail price)

Rates:

Freedom – 8 grams per acre
Assure II – 0.15 to 0.20 L / acre
Sure-Mix – 5 L per 1000 L of spray volume
(One case treats 40 acres)

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L / acre)

Pressure:

275 kPa (40 psi)

Nozzles:

Flat Fan

How it Works:

Freedom is a systemic herbicide that is absorbed through the foliage and translocated to the growing points within plants. Growth stops soon after application of Freedom. After 1 to 3 weeks plants will discolour (yellowing, reddening, or purpling) starting with the newest leaves and spreading out from there eventually resulting in plant death.

Assure II is a systemic herbicide rapidly absorbed and readily translocated from the treated foliage to the root system and growing points. Symptoms in grasses are reduced growth and chlorosis (yellowing) of new leaves within 1 to 2 weeks of application, eventually resulting in plant death.

Effects of Growing Conditions:

For the effects of growing conditions on Assure II see Assure II (page 65).

Temporary crop yellowing or delay in flowering may occur with normal applications of Freedom Gold.

Freedom Gold applied to crops that have been under stress before application may result in crop injury. Stress conditions within 3 days of application may also result in crop injury.

Weeds under stress conditions at the time of application may not be adequately controlled.

Stress conditions include prolonged cool periods, frost, low fertility, drought, water-saturated soils, and disease or insect damage.

Injury symptoms can be crop discoloration (yellowing, purpling or reddening), stunting, or delay in flowering.

Tank Mixes:

Herbicides: Freedom Gold can be tank mixed with Lontrel at 0.17 L/acre. Add Sure-Mix.

Fertilizers: None

Insectcides: None

Restrictions:

Rainfall: Freedom - Several hours of dry weather are needed after application of Freedom to allow uptake by the plants. Broadleaf weed control may be reduced if rainfall occurs soon after application.

Assure II - Rainfall within one hour may reduce grass control.

Grazing: Must not be grazed or fed to livestock within 74 days of application.

Preharvest interval: Must not be harvested within 74 days of application.

Recropping Interval: Do not plant any crop other than wheat or barley for 30 days after application.

Aerial Application: Do not apply by air.

Storage: Store in closed original container in a dry area away from food or feed.

Environment: Do not apply within 15 m of water bodies, wetlands or sensitive plants.

Tank Cleaning:

Freedom can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Freedom should be flushed out immediately after Freedom is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with an ammonia rinse (1L of 3% ammonia per 100 L of water). All nozzles, screens and filters should be removed and cleaned separately during the cleaning process.

Hazard Rating:

Assure II:

Danger – Corrosive to eyes

Warning – Skin Irritant. Potential skin sensitizer.

This product contains 4 percent phenol that has been determined to be of toxicological concern.

Freedom:

Warning – Eye and Skin Irritant

Frontier

Herbicide Group – 15

(Refer to page 20)

Company:

BASF

Formulation:

900 g/L dimethanamid formulated as an emulsifiable concentrate. Container size - 10 L

Crops:

Corn (not sweet corn, popcorn, or corn grown for seed) and dry beans (white and kidney beans only).

Weeds:

Green foxtail.

Crop Stage:

Pre-plant incorporated (corn and beans) and pre-emergence (beans only).

Weed Stage:

Pre-emergence.

Rates:

Pre-plant incorporated treatments: Apply at 0.51 to 0.57 L/acre. Apply at the higher rate on fine-textured or high organic soils and for heavier anticipated weed problems.

Pre-emergence treatments:

SOIL TYPE	RATE (L/ACRE)		
	Less than 3 Percent Organic Matter	3 to 6 Percent Organic Matter	7 to 10 Percent Organic Matter
Coarse Textured Soils	0.45	0.45	0.51
Medium and Fine Textured Soils	0.45	0.51	0.57

Cost:

$17.82 to $22.57/acre (2000 suggested retail prices).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

200 to 300 kPa (30 to 45 psi).

Nozzles:

Flat fan. Use 16 mesh suction screen, 50 mesh elsewhere on sprayer.

Application and Incorporation:

For pre-plant incorporated treatments, apply Frontier as a broadcast treatment and incorporate using a harrow, rolling cultivator or other implement capable of giving uniform, shallow incorporation into the top 5 cm (2 inches) of soil within 7 days of planting. Avoid deeper incorporation or reduced weed control and/or crop injury may result. Immediate incorporation after application is not necessary.

Beans must be planted at least 4 cm (1.5 inches) deep or crop injury may occur.

How it Works:

Frontier is absorbed through shoots and roots of germinating weeds but primarily through the coleoptile in grassy weeds. Weeds are controlled before they emerge.

Effects of Growing Conditions:

Rainfall is required within 7 to 10 days of application to activate and move Frontier into the soil zone. If dry conditions persist, a shallow cultivation or the use of a rotary hoe is necessary to move the herbicide into moist soil and control weed escapes. Shallow tillage is important to minimize dilution of the herbicide. If drought conditions persist after pre-plant incorporated or pre-emergence applications, weed control may not be adequate.

Tank Mixes:

Herbicides: None registered.

Fertilizers: May be applied with a liquid fertilizer carrier. Test compatibility of Frontier with liquid fertilizer by mixing a small amount of herbicide with a proportional quantity of liquid fertilizer in a jar. May also be impregnated on dry bulk fertilizers for pre-plant incorporated treatments. A minimum of 90 kg/acre of dry bulk fertilizer should be applied. Do not impregnate Frontier on nitrate fertilizers, superphosphates or limestone.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Rainfall after application is important for good weed control.

Grazing: Do not graze or feed the treated corn crop within 40 days of application. Do not graze the treated bean crop or feed bean forage, hay or straw to livestock.

Recropping: Do not plant winter wheat within 120 days of application.

Aerial Application: Not registered.

Storage: Do not freeze. Must be stored under heated warehouse conditions.

Tank Cleaning:

The manufacturer does not provide information on tank cleaning. Generally, a mixture of water and household ammonia (1 L per 100 L of water) flushed twice through the tank and circulated through the lines and nozzles is an effective method of cleaning the sprayer tank.

Hazard Rating:

Caution Poison.

Warning Eye Irritant and Potential Skin Sensitizer.

Fusion

Herbicide Group – 1
(Refer to page 20)

Company:

Aventis CropScience

Formulation:

One case of Fusion contains:

Component 1 - 80.5 g/L fenoxaprop-p-ethyl formulated as an emulsifiable concentrate. Container size - 3.7 L.

Component 2 - 125 g/L fluazifop-p-butyl formulated as an emulsifiable concentrate. Container size - 6.5 L.

Crops:

Canola, flax (including Solin - low linolenic flax varieties), lentils, mustard, and field peas.

Weeds:

Barnyard grass
Green foxtail
Persian darnel

Volunteer barley
Volunteer wheat
Wild oats

Crop Stage:

CROP	STAGING
Canola	Do not apply beyond the 5 leaf stage, 80 day preharvest interval
Flax (including Solin)	Tolerant at all growth stages, 80 day preharvest interval
Field peas	Tolerant at all growth stages, 75 day preharvest interval
Lentils	Do not apply beyond the 6 node stage, 82 day preharvest interval
Mustard	Do not apply beyond the 5 leaf stage, 70 day preharvest interval

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

1 to 6 leaf stage of annual grassy weeds. Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occur when weeds are controlled before tillering.

Cost:

$11.95/acre (2000 suggested retail price).

Rates:

Component 1 - 0.19 L/acre. Component 2 - 0.32 L/acre. One case treats 20 acres.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Water Volume:

5 to 10 gallons/acre (23 to 45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

80° or 110° stainless steel flat fan nozzles tilted forward at a 45° angle.

How it Works:

Fusion is a systemic herbicide that is translocated from treated leaves to growing points within plants. Symptoms include reduced leaf growth and chlorosis (yellowing) of the treated plants within 1 to 3 days. Plant death occurs 14 to 28 days after application.

Effects of Growing Conditions:

If daytime temperatures before or after application are very hot and dry with low humidity, reduced control may result. Do not apply to crop that is stressed (frost, heat, drought, water saturated soil, disease, etc.) as crop injury may result.

Tank Mixes:

Herbicides: Canola - Fusion may be mixed with Lontrel (0.23 L/acre).

Canola (Argentine varieties only) - Fusion may be mixed with Muster (8 to 12 g/acre) for control of broadleaf weeds listed on Muster label.

Flax (including Solin) - Fusion may be mixed with MCPA ester or amine (up to 0.34 L/acre - 500 g/L formulations). Fusion may also be mixed with Buctril M (0.40 L/acre). Under adverse conditions, tank mixes of Fusion and Buctril M or Fusion and MCPA may result in reduced grassy weed control.

Fertilizers: None registered.

Insecticides: None registered.

Note: An interval of 4 days prior to, or 4 days after application of Fusion is required before any other pesticide can be applied (unless registered in a Fusion tank mix).

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 2 hours may result in reduced control.

Grazing: Do not graze treated crops or cut for feed prior to crop maturity.

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Environment: Do not apply within 15 m of a body of water or wetland area.

Tank Cleaning:

Before and after using Fusion, complete a thorough cleaning of the spray tank, lines and filter. This can be particularly important as the previously sprayed product may cause injury to the crop you intend to spray. Spray equipment should be triple-rinsed using a water/household ammonia solution. Scrubbing the tank is also highly recommended.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members and others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Experimental studies have shown that the active ingredient in Component 2 may cause birth defects in laboratory animals. Women capable of bearing children should avoid contact with this product.

glyphosate

Herbicide Group – 9
(Refer to page 20)

For weed control prior to crop emergence, in summer fallow and shelterbelts, and perennial weed control with spot treatments in crops or after harvest.

Company, Formulation and Cost:

Product Name	Company	Salt[1]	Glyphosate acid content	Formulation	Container size[2]	Cost
Credit	Nufarm	IPA	356 g/L	Solution	1, 2, 3	$8.50 per L
Glyfos	Cheminova	IPA	360 g/L	Solution	1, 2, 5	$8.95 per L
Maverick	Dow AgroSciences	IPA	356 g/L	Solution	1, 2	$7.99 per L
Renegade	Monsanto	IPA	356 g/L	Solution	1, 2	$8.15 per L
Roundup Dry	Monsanto	MA	68.5%	Soluble granule	7	$16.32 per kg
Roundup Original	Monsanto	IPA	356 g/L	Solution	1, 2, 4	$8.99 per L
Roundup Renew	Monsanto	MA	65%	Soluble granule	8	$17.40 per kg
Roundup Transorb	Monsanto	IPA	360 g/L	Solution	1, 2, 3, 4, 6	$9.79 per L
Touchdown XP*	Syngenta	TMS	440 g/L	Solution	3, 5	$12.66 per L
Touchdown 480	Syngenta	TMS	330 g/L	Solution	1	$9.20 per L
Vantage	Dow AgroSciences	IPA	356 g/L	Solution	1, 2, 3	$8.95 per L
Vantage Plus	Dow AgroSciences	IPA	360 g/L	Solution	1, 2, 3	$9.79 per L
Victor	InterAg/Aventis	IPA	356 g/L	Solution	1,2	$8.95 per L

[1] Salt type: IPA = Isopropylamine, TMS = Trimethylsulfonium, MA = Monoammonium

[2] Container sizes available:

1) 2 x 10 L 2) 115 L 3) 450 L 4) 750 L 5) 1000 L 6) 1200 L 7) 10.4 kg 8) 11.2 kg

* includes Rely adjuvant – 2 x 10 L.

Some products may be more effective (not related to higher glyphosate content) under adverse conditions, but that benefit is reduced when applications are made under optimal conditions for activity (i.e. rapid weed growth). When selecting a glyphosate product, consult the product manufacturer or ask your retailer about differences in the level of post-sales support provided for different products.

Crops:

- Pre-seeding burn-off or post-harvest stubble (all crops)*
- Spot treatment of perennial weeds in barley, corn, forage grasses and legumes, oats, soybeans, wheat, including crops for seed production.
- Summer fallow*
- Shelterbelts*

*Roundup Renew not registered for these uses.

Water Volume

Do not use 'hard' or dirty water or weed control may be reduced. Using clean water at 5 to 10 gal/acre (23-45 L/acre) will provide acceptable weed control in most situations; use of the lower volume will improve control. Refer to specific weed control situations or labels for more information on water volumes and adjuvants.

Pressure

200 to 275 kPa (30 to 40 psi)

Rates and Timing for Annual weed control prior to crop emergence or in summer-fallow

WEEDS CONTROLLED	WEED STAGE	PRODUCTS	RATE PER ACRE	SURFACTANT*
Grasses: Green foxtail, volunteer cereals, wild oat (light infestations) **Broadleaves:** lady's-thumb, stinkweed, volunteer canola (NOT including Roundup Ready varieties), wild mustard	Less than 3 inches (8 cm) high. Apply at the 1 to 3 leaf stage of wild oat.	Credit, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown 480, Vantage, Vantage Plus, Victor	0.30 L	0.14 L/acre
		Roundup Dry	0.16 kg	
		Touchdown XP	0.23 L	Rely or Frigate (0.5% v/v)
Above weeds plus: **Grasses:** heavy infestations of wild oat **Broadleaves:** suppression of flixweed, kochia	1 to 3 leaves for wild oat. Weeds 3 to 6 inches (8 to 15 cm).	Credit, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown 480, Vantage, Vantage Plus, Victor	0.40 L	0.14 L/acre
		Roundup Dry	0.21 kg	
		Touchdown XP	0.30 L	Rely or Frigate (0.5% v/v)
Above weeds plus: **Grasses:** downy brome, Persian darnel, **Broadleaves:** Canada fleabane, common ragweed, flixweed, hemp-nettle, lamb's-quarters, narrow-leaved hawk's-beard, redroot pigweed, Russian thistle, volunteer flax, wild buckwheat	Canada fleabane, common ragweed-less than 3 inches (8 cm) high. Other weeds less than 6 inches (15 cm). Use high rate for narrow-leaved hawk's-beard 3 to 6 inches (8-15 cm) or wild buckwheat at the 3-4 leaf stage.	Credit, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown 480, Vantage, Vantage Plus, Victor	0.51 to 0.77 L	Not required
		Roundup Dry	0.27 to 0.40 kg	
		Touchdown XP	0.38 to 0.57 L	Rely or Frigate (0.5% v/v)
Above weeds plus: **Grasses:** annual blue grass, crabgrass, **Broadleaves:** annual sow-thistle, kochia, prickly lettuce, shepherd's-purse	Less than 6 inches (15 cm) high	Credit, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown 480, Vantage, Vantage Plus, Victor	0.91 L	Not required
		Roundup Dry	0.48 kg	
		Touchdown XP	0.69 L	Rely or Frigate (0.5% v/v)
Above weeds	Greater than 6 inches (15 cm) high	Credit, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown 480, Vantage, Vantage Plus, Victor	1.42 L	Not required
		Roundup Dry	0.74 kg	
		Touchdown XP	1.05 L	Rely or Frigate (0.5% v/v)

* Unless otherwise specified, use one of the following surfactants: Agral 90, Agsurf, Companion, Enhance, Frigate or LI 700.

2. Quackgrass control prior to seeding or after harvest

QUACK GRASS STAGE	PRODUCT	RATE PER ACRE	SURFACTANT
Season long control of light to moderate infestation. Apply when quack grass is 8 inches (20 cm) tall and has 3 to 4 actively growing leaves. Apply spring or fall.	Credit, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown 480, Vantage, Vantage Plus, Victor	1.0 L	Not required
	Roundup Dry	0.53 kg	
	Touchdown XP	0.75 L	Rely or Frigate (0.5% v/v)
Apply when quack grass has 3-4 new leaves for long term control of heavy infestations. Use high rate for sod-bound quack grass (left undisturbed for at least 2 years).	Credit, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown 480, Vantage, Vantage Plus, Victor	1.0 to 2.8 L	Not required
	Roundup Dry	0.53 to 1.5kg	
	Touchdown XP	0.75 to 2.1 L	Rely or Frigate (1% v/v) or Enhance at (0.20 L/acre)

Do not apply fall treatments if a hard frost has occurred (-5°C) or if plants are drought stressed. Spread straw to allow regrowth and good spray coverage.

Cultivation prior to application will result in reduced control. Do not cultivate between harvest and treatment when using fall applications. If using spring applications on fields which have been fall-tilled, delay application until the quack grass has reached the 4-5 leave stage. (This will occur 1 to 4 weeks later on fall-tilled fields than in undisturbed fields).

Cultivation after application usually will improve control of quack grass. Wait a minimum of 3 days after application before cultivating. If growing conditions are poor (cold or dry), particularly in the fall, waiting longer than 5 days may improve control.

3. Canada thistle control in summer-fallow, shelterbelts and post-harvest

WEED STAGING	PRODUCT	RATE PER ACRE
Bud stage or beyond. Allow at least 5 days after application before tillage.	Credit, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown 480, Vantage, Vantage Plus, Victor	1.9-2.8 L
	Roundup Dry	1-1.5 kg
	Touchdown XP	1.5-2.1 L*
Rosettes at least 6 inches (15 cm) in diameter, treated in late summer, following tillage in spring and early summer (up to August 1). Allow thistles to regrow for 5 weeks following last tillage. Wait a minimum of 10 days after application before tillage. Treatment after a mild frost is possible if leaves are green and pliable and plants are actively growing.	Credit, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown 480, Vantage, Vantage Plus, Victor	1.0 L
	Roundup Dry	0.53 kg
	Touchdown XP	0.75L*
Post-harvest stubble treatment. Allow 8-10 inches (20-25 cm) of new growth before application. Plants must be sprayed at least 2 weeks prior to killing frost. Straw should be removed or evenly spread to allow for proper regrowth and spray coverage.	Credit, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown 480, Vantage, Vantage Plus, Victor	1.9-2.8 L
	Roundup Dry	1.0-1.5 kg
	Touchdown XP	1.5-2.1 L*

* Add Rely or Frigate adjuvant at 0.5% v/v.

4. Dandelion control (other than preharvest)

Apply up to and including dandelion bloom for best results.

PRODUCT	Less than 6 inches (15 cm) diameter. Allow 3 or more days after treatment before tillage.	Greater than 6 inches (15 cm) diameter. Use higher rate when infestation is heavy.	Prior to seeding or after harvest. Use higher rate for weeds beyond 3 inches (8 cm) or for heavy infestation. Allow 7 or more days after treatment before tillage.
Credit, Maverick, Roundup Original, Roundup Transorb, Vantage, Vantage Plus	1.0 L/acre	1.5 – 2.0 L/acre	-
Roundup Dry	0.53 kg/acre	0.80-1.06 kg/acre	-
Touchdown 480	-	-	1.8-2.8 L/acre
Touchdown XP	-	-	1.3 - 2.1L/acre*

* Add Rely or Frigate adjuvant at 0.5% v/v.

5. Alfalfa Control (other than preharvest)

WEED STAGE	PRODUCT	RATE PER ACRE
Fall control of alfalfa in early bud to full bloom stage. Use high rate when alfalfa populations are high or when perennial grasses are present. Allow at least 5 days before tillage. See tank mix section for minimum tillage or spring applications. Apply with 5-30 gal/acre (23-135 L/acre) water.	Credit, Maverick, Renegade, Roundup Original, Roundup Transorb, Vantage, Vantage Plus	1.5 – 2.0 L
	Glyfos	2.8 to 4.8 L
	Roundup Dry	0.8 – 1.1 kg
Prior to seeding or after harvest. Use higher rate for weeds beyond 3 inches (8 cm) in height or for heavy weed infestations. Wait 7 days after application for tillage. Apply in 5-30 gallons/acre (23-135 L/acre) water.	Touchdown XP	0.7 – 1.35 L*
	Touchdown 480	0.9 – 1.8 L

*Add Rely or Frigate adjuvant at 0.5% v/v.

6. Other perennial weed control in summerfallow, shelterbelts and post-harvest

(Refer to individual product labels for detailed application information.)

	RATES IN UNITS PER ACRE		
	Foxtail Barley Seedling to heading*	**Toadflax**	**Other Perennial weeds****
Credit, Maverick, Roundup Original, Roundup Transorb, Vantage, Vantage Plus	1.0-2.0 L	1.0 L (vegetative stage in summer fallow)	4.9 L
Renegade, Victor	0.4 L (suppression only) or 2.8 to 4.8 L to control	1.0 L (vegetative stage in summer fallow)	4.9 L
Glyfos, Touchdown 480	0.4 L (suppression only) or 2.8 to 4.8 L to control	2.8 to 4.8 L (early bud stage)	4.9 L
Roundup Dry	0.53-1.1 kg	0.53 kg (vegetative stage in summer fallow)	2.5 kg
Roundup Renew	1.1 kg	1.1 kg (Bud to full bloom stage)	1.6 to 2.7 kg
Touchdown XP***	0.30 L (suppression) or 2.1 to 3.6 L (control)	2.1 to 3.6 L (early bud stage)	3.6 L

* Late fall applications may provide better control of established foxtail barley plants than spring applications.

**Perennial weeds such as absinthe, blue grass spp., smooth brome grass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow-thistle, and yellow nutsedge applied at the early heading to early bud stage.

*** Add Rely or Frigate adjuvant at 1.0% v/v. Enhance adjuvant (0.20 L/acre) may be used for Touchdown XP applications of 0.81 L/acre or greater.

7. **Patch treatments of perennial weeds in wheat, oat, barley, corn, soybean, forage legumes and forage grasses. (refer to product label for detailed application instructions)**

	RATES PER ACRE				
	Quack grass 8 in (20 cm) tall	**Canada thistle Bud or beyond**	**Milkweed Bud to bloom**	**Other perennial weeds***	**Spot treatment rates for hand held equipment**
Credit, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Vantage, Vantage Plus, Victor	1.0-2.8 L	1.9-2.8 L	4.9 L	2.8-4.9 L	1-2 L per 100 L water**
Roundup Dry	0.53-1.5 kg	1.0-1.5 kg	2.5 kg	1.5-2.5 kg	0.5-1.0 kg per 100 L water**
Roundup Renew	1.1 kg	1.1 kg	-	-	0.56 kg per 100 L water
Touchdown 480	1.0-2.8 L	1.9-2.8 L	4.9 L	2.8-4.9 L	Not registered
Touchdown XP***	0.75-2.1 L	1.5-2.2 L	3.6 L	2.2-3.6 L	Not registered

*Perennial weeds such as absinthe, blue grass spp., smooth brome grass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow-thistle, and yellow nutsedge applied at the early heading to early bud stage.

**Use the low rate for quack grass and the high rate for all other perennials.

***Add Rely or Frigate adjuvant at 1.0% v/v. Enhance at 0.2 L/acre may be used for Touchdown XP applications of 0.81 L/acre or higher.

8. **Tank Mixes:**

	RATES PER ACRE			
	Pre-seeding cereals: Pardner (0.51 L)	**Alfalfa control in spring or fall: 2,4-D* (0.50 to 1.0 L)**	**Chem fallow: 2,4-D* (0.5 L) or Banvel II (0.12 L) or Pardner (0.51 L).**	**Canada thistle control in stubble or fallow: Banvel II (0.51 L)**
Credit, Maverick, Roundup Original, Roundup Transorb, Vantage, Vantage Plus	0.3-0.4 L	1.0-2.0 L	0.3-0.4 L	0.69 L
Glyfos, Renegade, Touchdown 480, Victor	0.3-0.4 L	Not registered	0.3-0.4 L	0.69 L
Roundup Dry	0.16-2.0 kg	0.53 – 1.1 kg	0.16-0.21 kg	0.36 kg
Touchdown XP	0.23-0.3 L	Not registered	0.23-0.3 L	0.57 L

* Both 500 g/L amine and equivalent ester formulations are registered tank mixes.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Nozzles:

Flat fan

How it Works:

Glyphosate is a nonselective, systemic herbicide which moves from treated foliage into roots and kills the entire plant. Visual effects include gradual wilting and yellowing of the plant which advance to complete browning of the above ground growth and deterioration of underground plant parts. Effects may not be visible for 7 to 10 days after application.

Effects of Growing Conditions:

Best results are achieved when temperatures are near 20°C and when weeds are actively growing.

Frost which kills more than 40% of the above ground tissue will reduce control.

Control will also be reduced if foliage is heavily covered with dust.

Restrictions:

Rainfall: Do not apply if rainfall is forecast for the time of application, as weed control may be reduced. Consult manufacturer for more information.

Grazing Interval: Do not graze or cut for hay, any crops treated with Touchdown 480/XP. All portions of crops treated with other products may be fed to livestock.

Recropping Interval: No restrictions.

Aerial application: Do not apply by air.

Storage: May be stored below 0°C.

Equipment: Do not mix, store or apply this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

Environment: Maintain a 15 m buffer zone from non-target areas

Tank Cleaning:

Wash equipment thoroughly with water immediately after use. When tank mixing with other products follow additional cleaning instructions provided for that product.

Do not clean equipment uphill from water bodies, dugouts or ditches, or near cropland or shelterbelts. Clean sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Touchdown 480/XP - Warning Poison

All other products - Skin and Eye Irritant

glyphosate

For Pre-Harvest Perennial Weed Control

Herbicide Group – 9
(Refer to page 20)

Company, Formulation and Cost:

Product Name	Company	Salt[1]	Glyphosate acid content	Formulation	Container size[2]	Cost
Credit	Nufarm	IPA	356 g/L	Solution	1, 2, 3	$8.50 per L
Glyfos	Cheminova	IPA	360 g/L	Solution	1, 2, 5	$8.95 per L
Maverick	Dow AgroSciences	IPA	356 g/L	Solution	1, 2	$7.99 per L
Renegade	Monsanto	IPA	356 g/L	Solution	1, 2	$8.15 per L
Roundup Dry	Monsanto	MA	68.5%	Soluble granule	7	$16.32 per kg
Roundup Original	Monsanto	IPA	356 g/L	Solution	1, 2, 4	$8.99 per L
Roundup Renew	Monsanto	MA	65%	Soluble granule	8	$17.40 per kg
Roundup Transorb	Monsanto	IPA	360 g/L	Solution	1, 2, 3, 4, 6	$9.79 per L
Touchdown XP*	Syngenta	TMS	440 g/L	Solution	3, 5	$12.66 per L
Touchdown 480	Syngenta	TMS	330 g/L	Solution	1	$9.20 per L
Vantage	Dow AgroSciences	IPA	356 g/L	Solution	1, 2, 3	$8.95 per L
Vantage Plus	Dow AgroSciences	IPA	360 g/L	Solution	1, 2, 3	$9.79 per L
Victor	InterAg/Aventis	IPA	356 g/L	Solution	1,2	$8.95 per L

[1] Salt type: IPA = Isopropylamine, TMS = Trimethylsulfonium, MA = Monoammonium

[2] Container sizes available:

1) 2 x 10 L 2) 115 L 3) 450 L 4) 750 L 5) 1000 L 6) 1200 L 7) 10.4 kg 8) 11.2 kg

* includes Rely adjuvant – 2 x 10 L.

Some products may be more effective (not related to higher glyphosate content) under adverse conditions, but that benefit is reduced when applications are made under optimal conditions for activity (i.e. rapid weed growth). When selecting a glyphosate product, consult the product manufacturer or ask your retailer about differences in the level of post-sales support provided for different products.

Crops:

	Barley, bean (dry), canola (rapeseed), lentil, field pea, soybean and wheat.	Flax	Solin (low linolenic flax varieties)	Forages	Oat
Credit, Maverick, Roundup Dry, Roundup Original, Roundup Renew, Roundup Transorb, Vantage, Vantage Plus	✓	✓	✓	✓	✓
Glyfos, Victor	✓	✓	✓		
Renegade	✓	✓	✓	✓	
Touchdown 480/XP	✓	✓	✓		✓

Do not apply to any crops grown for seed. May be applied to barley grown for malt. Contact malt barley buyers prior to application to confirm acceptance of glyphosate-treated barley.

Weeds Controlled:

Product	Quack grass 4-5 green leaves	Canada thistle and perennial sow-thistle at bud stage or beyond	Common milkweed at bud to bloom stage	Toadflax at bud to full bloom stage	Dandelion from rosette to full bloom stage
Credit, Maverick, Renegade, Roundup Original, Roundup Transorb, Vantage, Vantage Plus	✓	✓	✓	✓	✓
Glyfos, Touchdown 480/XP Victor	✓	✓	✓		
Roundup Dry	✓	✓	✓	✓	✓
Roundup Renew	✓	✓	✓	✓	✓

Crop Stage:

Apply to crops (except forage) when grain moisture is less than 30%. The following chart lists visual symptoms that can be used as guidelines to when 30% grain moisture has been reached.

CROP*	VISUAL SYMPTOMS
Wheat/Barley/Oat	Hard dough stage – a thumbnail impression remains on seed.
Canola	Pods are green to yellow and most seeds are yellow to brown.
Flax (including Solin - low linolenic varieties)	Majority (75 to 80% of bolls) are brown.
Lentil	Lowermost pods (bottom 15%) are brown and rattle when shaken.
Pea	Majority (75 to 80%) of pods are brown.
Soybean	Stems are green to brown in colour and pod tissue is brown and dry in appearance (80 to 90% leaf drop).
Dry Bean	Stems are green to brown in colour and pods are mature (yellow to brown) and 80 to 90% of the original leaves have dropped.
Forage	3 to 7 days prior to the last cut before rotation or forage renovation. Do not apply to forage stands that are to be maintained.

*See the crops section for a guide to the products registered on each crop

Rates:

Glyfos	- 1 L/acre (for annual crops only)
Credit, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown 480, Vantage, Vantage Plus, Victor	- 1 L/acre (annual crops) - 1 to 2 L/acre (forage)
Roundup Dry	- 0.53 kg/acre (annual crops) - 0.53 to 1.06 kg/acre (forages)
Roundup Renew	- 0.56 kg/acre (annual crops) - 1.13 kg/acre (forages)
Touchdown XP	- 0.75 L/acre (annual crops only)

Water Volume:

Do not use 'hard' or dirty water or weed control may be reduced. Use clean water at 5 to 10 gal/acre (23 to 45 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi)

Nozzles:

Flat fan

How it Works:

Glyphosate is a nonselective, systemic herbicide which moves from treated foliage into roots and kills the entire plant. Visual effects include gradual wilting and yellowing of the plant which advance to complete browning of the above ground growth and deterioration of underground plant parts. Effects may not be visible for 7 to 10 days after application.

Effects of Growing Conditions:

Best results are achieved when temperatures are near 20°C and when weeds are actively growing. Frost which kills more than 40% of the above ground tissue will reduce control. Control will also be reduced if foliage is heavily covered with dust.

Restrictions:

Rainfall: Do not apply if rainfall is forecast for the time of application, as weed control may be reduced. Consult manufacturer for more information.

Grazing Interval: Do not graze or cut for hay, any crops treated with Touchdown 480/XP. All portions of crops treated with other products may be fed to livestock.

Recropping Interval: No restrictions.

Aerial application: Consult manufacturer for current registration status.

Storage: May be stored below 0°C.

Equipment: Do not mix, store or apply this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

Environment: Maintain a 15 m buffer zone from non-target areas

Tank Cleaning:

Wash equipment thoroughly with water immediately after use. When tank mixing with other products follow additional cleaning instructions provided for that product.

Do not clean equipment uphill from water bodies, dugouts or ditches, or near cropland or shelterbelts. Clean sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Touchdown 480/XP- Warning Poison

All other products - Skin and Eye Irritant

glyphosate

For use in Roundup Ready Crops

Herbicide Group – 9
(Refer to page 20)

Company, Formulation and Cost:

Product Name	Company	Salt[1]	Glyphosate acid content	Formulation	Container size[2]	Cost
Roundup Original	Monsanto	IPA	356 g/L	Solution	1, 2, 4	$8.99/L
Roundup Transorb	Monsanto	IPA	360 g/L	Solution	1, 2, 3, 4, 5	$9.79/L
Vantage	Dow AgroSciences	IPA	356 g/L	Solution	1, 2, 3	$8.95/L
Vantage Plus	Dow AgroSciences	IPA	360 g/L	Solution	1, 2, 3	$9.79/L

[1] Salt type: IPA = Isopropylamine

[2] Container sizes available: 1) 2 x 10 L, 2) 115 L, 3) 450 L, 4) 750 L, 5) 1200 L

Some products may be more effective (not related to higher glyphosate content) under adverse conditions, but that benefit is reduced when applications are made under optimal conditions for activity (i.e. rapid weed growth). When selecting a glyphosate product, consult the product manufacturer or ask your retailer about differences in the level of post-sales support provided for different products.

Crops:

Roundup Ready Canola

Roundup Ready field corn (Roundup Transorb only)

Roundup Ready Soybean

Crop Stage:

Canola - cotyledon to 6 leaf stage. Temporary yellowing may occur if applied at the 4-6 leaf stage of the crop.

Corn - 1-8 leaf stage

Soybean - first trifoliate through flowering.

Weeds, Staging and Rates in Roundup Ready Canola:

Apply 0.33 to 0.5 L/acre to control:

Annual grasses: barnyard grass[1], green foxtail, volunteer cereals, wild oat

Annual broadleaves: annual smartweed spp.**, chickweed, corn spurry, cow cockle*, hemp-nettle, kochia, lamb's-quarters, narrow-leaved hawk's-beard, night-flowering catchfly*, redroot pigweed, Russian thistle, shepherd's-purse*, stinkweed, volunteer canola (except Roundup Ready varieties), wild mustard, wild tomato.

* Low rates can be used only up to the 3 leaf stage of the crop otherwise use high rate.

**Low rates can be used only when annual smartweed is in 4 - 6 leaf stage.

Apply 0.50 L/acre to control:
cleavers, flixweed[1], wild buckwheat, stork's-bill[1], narrow-leaved hawk's-beard[1] or for suppression of Canada thistle, dandelion, perennial sow-thistle, and season long control of quack grass.
A second application of 0.5 L/acre may be made to control round-leaved mallow[1] and to provide season long control of Canada thistle, foxtail barley, and perennial sow-thistle, as long as the application is made within the above stage recommendations.

[1] Roundup Transorb only.

Weeds, Staging and Rates in Roundup Ready Corn[2] and Roundup Ready Soybean:

Apply 1.0 L/acre to control:

Grasses: barnyard grass, crabgrass spp., foxtail (green, yellow, giant), quack grass, proso millet.

Broadleaves: Canada thistle[1], cocklebur, common milkweed[1], common ragweed, eastern-black flowering night-shade, lady's-thumb, lamb's-quarters, perennial sow-thistle[1], pigweed (smooth, redroot), smartweed spp., velvetleaf, wild mustard, wild buckwheat, yellow nutsedge.

A second application at 1.0 L/acre may be made to control late flushes within the appropriate crop stage.

To maximize weed control and crop yield, apply when weeds are less than 10 inches (25 cm) high.

[1] Roundup Transorb only.
[2] Only Roundup Transorb is registered for use on Roundup Ready Corn.

Water Volume:

Do not use 'hard' or dirty water or weed control may be reduced. Using clean water at 5 to 10 gal/acre (23-45 L/acre), will provide acceptable weed control in most situations; use of the lower volume will improve control.

Pressure:

200 to 275 kPa (30 to 40 psi)

Nozzles:

Flat fan

How it Works:

Glyphosate is a nonselective, systemic herbicide which moves from treated foliage into roots and kills the entire plant. Visual effects include gradual wilting and yellowing of the plant which advance to complete browning of the above ground growth and deterioration of underground plant parts. Effects may not be visible for 7 to 10 days after application.

Effects of Growing Conditions:

Best results are achieved when temperatures are near 20°C and when weeds are actively growing. Frost which kills more than 40% of the above ground tissue will reduce control. Control will also be reduced if foliage is heavily covered with dust.

Tank mixes:

In Roundup Ready Canola varieties, all products at 0.5 L/acre may be tank mixed with Lontrel at 0.112 L/acre for control of Canada thistle and wild buckwheat.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Do not apply if rainfall is forecast for the time of application, as weed control may be reduced. Consult manufacturer for more information.

Grazing Interval: All portions of crops treated may be fed to livestock.

Recropping Interval: No restrictions.

Aerial application: Do not apply by air.

Storage: May be stored below 0°C.

Equipment: Do not mix, store or apply this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

Environment: Maintain a 15 m buffer zone from non-target areas

Tank Cleaning:

Wash equipment thoroughly with water immediately after use. When tank mixing with other products follow additional cleaning instructions provided for that product.

Do not clean equipment uphill from water bodies, dugouts or ditches, or near cropland or shelterbelts. Clean sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Skin and Eye Irritant

Gramoxone

Herbicide Group – 22
(Refer to page 20)

Company:

Syngenta

Formulation:

200 g/L paraquat. Container size - 5 L, 1 L.

Crops:

Stale seedbed - Non-selective weed control applied prior to crop emergence in beans, corn, potatoes, peas, soybeans.

Non-selective weed control applied as a directed spray between rows in row crops.

Control of weed seedlings in established alfalfa and bird's-foot trefoil for hay applied after first cut.

Control of weed seedlings in bird's-foot trefoil for seed.

Non-selective weed control applied as a directed spray in and around shelterbelt trees.

Weeds:

Annual weed burn-off.

Crop Stage:

Stale seedbed - apply 3 days prior to crop emergence.

Established alfalfa and bird's-foot trefoil for hay - apply 5 days after first cut.

Bird's-foot trefoil for seed - apply in spring when bird's-foot trefoil shoots are 3 to 6 inches (7.5 to 15 cm) long.

Shelterbelts - avoid contact with foliage.

Weed Stage:

Best control when weeds are less than 2 inches (5 cm) in height or diameter.

Cost:

$21.06 to $42.13/acre (2000 suggested retail price).

Rates:

If weeds are less than 2 inches (5 cm) in height, apply 1.1 L/acre (one 5 L jug treats 4.5 acres). If weeds are taller than 2 inches (5 cm), increase the rate of Gramoxone to 2.2 L/acre (one 5 L jug treats 2.2 acres).

Water Volumes:

Use 30 to 110 gallons/acre (135 to 500 L/acre). Use the higher water volumes within the range if weed growth is dense.

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan.

How it Works:

Gramoxone is a contact herbicide that is absorbed into green leaves and stems where it causes rapid bleaching of green tissue. Plant wilting and desiccation begins within several hours of application, with complete plant death occurring in 1 to 3 days.

Effects of Growing Conditions:

Best results on cloudy days or just prior to darkness.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within 1 hour will reduce weed control.

Grazing: Do not graze or harvest treated foliage. Regrowth from treated alfalfa or bird's-foot trefoil may be fed to livestock.

Recropping: None.

Aerial Application: No restrictions on label, however, since this product requires a minimum of 30 gallons/acre of water, applications by air are impractical.

Storage: Do not freeze.

Tank Cleaning:

When finished spraying Gramoxone, rinse the sprayer out with clean water. Run through pump, lines and nozzles. Drain tank by spraying out on an untreated portion of a crop on which the product is registered, or by spraying on uncropped land. Refill sprayer with water and Agral 90, Agsurf at 0.6 L per 1,000 L spray solution. Run the solution through lines and boom. Spray out, then refill with clean water. Leave equipment standing overnight, then drain water out.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Danger Poison

Gramoxone PDQ

Herbicide Group – 22
(Refer to page 20)

Company:

Syngenta

Formulation:

132 g/L paraquat ion present as the dichloride salt.

66 g/L diquat ion present as the dibromide salt.

Container size - 10 L.

Crops:

Gramoxone PDQ can be applied prior to, or immediately following the seeding of the these crops:

barley, canaryseed, canola, corn, dry common beans, field peas, flax (including low linolenic acid varieties), lentils, mustard, oats, potatoes, rye, soybeans, sunflowers, triticale, wheat, a variety of vegetable crops and vegetation control around tree and vine fruit crops.

Gramoxone PDQ is inactivated upon contact with the soil so it has no residual effect in the soil.

Weeds:

For control of annual weed seedlings, as well as top-growth control of perennial weeds.

Crop Stage:

Apply before or after seeding, but prior to crop emergence to control emerged weeds in conventional, minimum and zero tillage production systems and when using stale seedbed production techniques. **Gramoxone PDQ can severely damage emerged plants! Not for use in emerged crop.**

Rates and Weed Stages:

Apply 2.0 to 4.0 L/ha (0.8 to 1.6 L/acre). For spring control of winter annuals, or when weed growth is dense and weeds are greater than 10cm in height, use at least 3.0 L/ha (1.2 L/acre).

Cost:

$8.72 to $17.44 per acre (2000 suggested retail price).

Water volume:

Apply in at least 10 gal/acre (45 L/acre) by ground sprayer.

Pressure:

200 to 275 kPa (30 to 40 psi)

Nozzles:

Flat fan

How it Works:

Gramoxone PDQ is a contact herbicide that is rapidly absorbed by the treated foliage of the plants. Through a series of chemical reactions in the plant, the active ingredients are transformed into compounds that destroy the cell membranes, allowing cell fluids to leak out. Wilting and desiccation of the plant begins within hours of application.

Effects of Growing Conditions:

Best results if applied on cloudy days or just prior to darkness.

Tank Mixes:

Herbicides: None registered.

Fertilizers: Clear liquid nitrogen or completely clear liquid fertilizers may also be used as a carrier for Gramoxone PDQ.

Insecticides: None registered.

Restrictions:

Rainfall: Rainfall shortly after application normally will not reduce effectiveness.

Grazing: Do not graze or harvest field crops within 30 days of treatment.

Recropping: None

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Buffer zones: Maintain a buffer zone of 20 meters between the last spray swath and the edge of sensitive terrestrial areas to protect non-target plants. Maintain a buffer of 45 m to the edge of sensitive aquatic areas to protect non-target aquatic plants and algae.

Tank Cleaning:

Wash equipment thoroughly after spraying. Use a wetting agent (Agral 90, Agsurf at 0.6 L per 1,000 L of water), flush and spray out, then thoroughly rinse with clean water. When possible, the equipment should be filled with clean water and left overnight. Spray out before storing equipment or using for other materials.

Hazard Rating:

Warning - Poison

Danger - Corrosive to Eyes

Danger - Skin Irritant.

Harmony Total

Herbicide Group – 1, 2
(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

Refine Extra: 50% thifensulfuron methyl, 25% tribenuron methyl; formulated as a water dispersible granule. Container size: 4 x 80 g water soluble pouches (320 g total).

Horizon: 240g/ L clodinafop-propargyl formulated as an emulsifiable concentrate. Container size: 1 x 3.68 L

Score adjuvant. Container size - 2 x 6.4 L

Crop:

Spring wheat (including durum)

Weeds:

Weeds controlled:

Chickweed
Corn spurry
Cow cockle
Flixweed
Green foxtail
Green smartweed
Hemp-nettle
Kochia
Lady's-thumb
Lamb's-quarters
Redroot pigweed
Russian thistle)
Shepherd's-purse
Stinkweed
Tartary buckwheat
Volunteer canola
(not including
CLEARFIELD canola)
Wild buckwheat
Wild mustard
Wild oat

Weeds Suppressed

Canada thistle
Cleavers
Round-leaved mallow
Scentless chamomile
Sow-thistle
Stork's-bill
Toadflax (less than 15 cm tall)

Crop Stage:

2 leaf up to emergence of flag leaf

Weed Stage:

Wild oat - 1 to 6 leaves, prior to the 4th tiller

Green foxtail - 1 to 5 leaf, prior to 3rd tiller emergence

Wild buckwheat - 1 to 3 leaves

Cleavers - 1 to 3 whorls

Stork's-bill, round-leaved mallow - 2 to 6 leaves

Canada thistle, perennial sow-thistle - under 6" tall, prior to budding

Chickweed - 1 to 6 leaf

Toadflax - less than 6" tall

For optimum control apply before the annual grasses tiller. Harmony Total will also control or suppress the broadleaf weeds listed for Refine Extra alone at 8 g/acre.

Cost:

$20.75/acre (2000 suggested retail price)

Rates:

Refine Extra - 8 g/acre
Horizon - 0.93 L (93 mL)/acre
Score - 0,8 L per 100 L of spray solution
One case treats 40 acres (16 ha)

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons per acre (45 L/acre)

Pressure:

275 kpa (40 psi)

Nozzles:

Flat fan nozzles with 50 mesh line strainers and screens.

How it Works:

Harmony Total is absorbed by foliage and translocated to growing points. Inhibits cell elongation in broadleaf weeds. Broadleaf weed growth stops soon after application. Discoloration (yellowing, purpling, reddening) of weeds becomes noticeable 1 to 3 weeks after application depending on growing conditions and weed species. Leaves and growing points of grass weeds turn yellow within 1 to 3 weeks of application. Browning and death occur 3 to 5 weeks after application.

Effects of Growing Conditions:

Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

Tank Mixes:

Do not tank mix with substances that contain boron or that release chlorine.

Herbicides: MCPA Ester (0.38 to 0.45 L/acre of 500 g/L formulation).

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Rainfall within 30 minutes will reduce grass control. Rainfall within 4 hours will reduce broadleaf control.

Grazing: Do not graze or harvest treated crops for forage within 3 days of application.

Recropping: No restrictions the year after treatment.

Aerial application: Do not apply by air.

Storage: Store in a cool, dry place. May be frozen.

Tank Cleaning:

To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Ammonia must be used to deactivate Harmony Total when cleaning.

Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill the tank with water while adding 1 litre of household ammonia (minimum 3 percent ammonia) for every 100 L of water. Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes. Again flush hoses, boom and nozzles with the cleaning solution, and then drain the tank. Remove and clean the nozzles and screens separately in a bucket containing a 1 percent solution of ammonia in water (1 L of 3 percent ammonia per 100 L water). If the spray equipment is to be used to spray crops other than cereals, repeat the above process and thoroughly wash the spray mixture from the outside of the spray tank and the boom. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer again, flush the tank, boom and hoses for 5 minutes with fresh water.

Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

Hazard Rating:

Eye and skin irritants.

Heritage 5G

Herbicide Group – 3
(Refer to page 20)

See Trifluralin (Summerfallow use in the brown soil zone in Saskatchewan) on page 218.

Hoe-Grass 284

Herbicide Group – 1
(Refer to page 20)

Company:
Aventis CropScience

Formulation:
284 g/L diclofop-methyl formulated as an emulsifiable concentrate. Container size - 10 L.

Crops:
Barley
Dry beans (white, black and pinto)
Fababeans
Flax
Lentils
Mustard
Potatoes
Peas (field and processing)
Rapeseed (canola)
Rye (spring and fall)
Soybeans
Sunflowers (except Corona)
Tame buckwheat
Triticale
Wheat (spring, durum and winter)

Seedling Forage grasses: (bromegrass, creeping red fescue, crested wheatgrass, intermediate wheatgrass, Russian wild ryegrass)

Seedling legumes: (alfalfa, red clover and sweet clover for forage or seed production.

Sainfoin and alsike clover for seed production only.

Weeds:
Barnyard grass
Green foxtail
Persian darnel
Volunteer corn
Wild oats
Yellow foxtail

Crop Stage:
Barley - 1 to 4 leaf stage of the crop and prior to tillering.

Other crops - no leaf stage restrictions but do not apply within 60 days of harvest.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:
Wild oats, green and yellow foxtail, barnyard grass - 1 to 4 leaf stage. Although registered for application up to the 5 leaf stage of wild oats, results at this stage are inconsistent and this use is not recommended. For best results, apply when the majority of weeds are in the 2 to 3 leaf stage.

Persian darnel - 1 to 3 leaf stage.

Volunteer corn - 6 to 10 inches (15 to 25 cm) in height.

Cost:
$13.43 to $18.89/acre (2000 suggested retail price).

Water Volume:
Ground equipment - 10 gallons/acre (45 L/acre).

Aerial equipment - A minimum of 3 gallons/acre (14 L/acre).

Pressure:
Ground equipment - 275 kPa (40 psi).

Aircraft - 300 kPa (45 psi).

Nozzles:
Ground equipment - 80° or 110° stainless steel flat fan nozzles tilted forward at an angle of 45°.

How it Works:
Hoe-Grass 284 is a systemic herbicide that is translocated from treated leaves to growing points within plants. Chlorosis (yellowing) appears in 2 or 3 days and plant death occurs in about 2 weeks.

Effects of Growing Conditions:
Application under hot (above 28°C) or droughty conditions will result in reduced weed control. Hoe-Grass 284 provides optimum results under cool, moist conditions.

Under certain environmental conditions, yellow blotches may appear on barley leaves. Under certain environmental conditions, especially hot, humid weather, leaf scorch on cereals and leaf cupping and burn on broadleaf crops may result from Hoe-Grass 284 application.

Rates:

CROP	RATE (L/ACRE)	ACRES TREATED PER 10 L CONTAINER
Dry beans (white, black, pinto), fababeans, potatoes, soybeans and sugar beets	1.42	7
Other labelled crops	1.01 - 1.13	10 - 7.75

Herbicide Tank Mix Table:

CROP	HERBICIDE TANK MIX
Wheat (spring and durum), flax, barley. Use 1.13 L/acre of Hoe-Grass 284.	Pardner - 0.405 L/acre. Will not control wild mustard beyond the 3 leaf stage.
Canola. Use 1.13 L/acre of Hoe-Grass 284.	Lontrel - 0.17 L/acre.

Tank Mixes:

Herbicides: See table.

Fertilizers: None registered.

Insecticides: Hoe-Grass 284 may be tank mixed with Decis 5EC on wheat (spring, winter and durum), barley, flax, rapeseed (canola), mustard and potatoes. See Decis 5EC label for recommended rates and cautions.

Do not tank mix Hoe-Grass 284 with any pesticide for aerial application. Do not tank mix Hoe-Grass 284 under stress conditions such as prolonged periods of drought, excessively hot temperatures or low humidity as reduced control of grassy weeds may result. Apply other pesticides, fertilizers or chemical additives at least 4 days after application of Hoe-Grass 284.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour of application will reduce control.

Grazing: Do not graze or cut for feed treated cereal crops prior to crop maturity. Do not feed treated forages in the year of treatment. Do not feed sainfoin or alsike clover for the life of the stand.

Recropping: No restrictions the year after application.

Aerial Application: May be applied by aircraft for weed control in wheat, barley, flax or rapeseed (canola) only. Apply in a minimum 3 gallons/acre (15 L/acre) water volume. Do not tank mix with any other products.

Storage: Do not freeze. Shake well before using.

Tank Cleaning:

Immediately after spraying Hoe-Grass 284, triple rinse with 1 L of 3 percent ammonia per 100 L water. Circulate the solution through lines and nozzles. Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Danger Corrosive

Hoe-Grass II

Herbicide Group – 1,6
(Refer to page 20)

Company:

Aventis CropScience

Formulation:

230 g/L diclofop methyl and 80 g/L bromoxynil formulated as an emulsifiable concentrate.

Container size - 10 L.

Crops:

Wheat (spring and durum), barley, spring rye, triticale, flax, seedling forage grasses grown for seed (bromegrass, creeping red fescue, Russian wild ryegrass, crested wheatgrass, intermediate wheatgrass).

Weeds:

- Barnyard grass
- Common groundsel
- Cow cockle
- Green foxtail
- Green smartweed
- Kochia
- Knawel
- Lady's-thumb
- Lamb's-quarters
- Night-flowering catchfly
- Persian darnel
- Redroot pigweed
- Russian thistle
- Scentless chamomile
- Stinkweed
- Tartary buckwheat
- Volunteer corn
- Wild buckwheat
- Wild mustard
- Wild oats
- Yellow foxtail

Weed Stage:

ANNUAL WEEDS	TIME OF APPLICATION
Wild oats, green and yellow foxtail, barnyard grass	1 to 4 leaf
Persian darnel	1 to 3 leaf
Volunteer corn	6 to 10 inches (15 to 25 cm in height)
Russian thistle	Seedling to 2 inches (5 cm) in height
Other labelled broadleaf weeds	seedling to early 4 leaf stage

Best results are obtained from early applications (2 to 3 leaf stage of grassy and broadleaf weeds).

Crop Stage:

Wheat, triticale and spring rye - no leaf stage restrictions, but do not apply within 60 days of harvest.

Barley - 1 to 4 leaf stage and before tillering.

Flax - 2 to 4 inches (5 to 10 cm) in height.

Seedling forage grasses - 2 to 5 leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Cost:

$19.79/acre (2000 suggested retail price).

Rates:

1.4 L/acre (one container treats 7 acres).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

80° or 110° stainless steel flat fan nozzles tilted forward at an angle of 45°.

How it Works:

For grassy weeds, Hoe-Grass II acts as a systemic herbicide that is translocated from treated leaves to growing points within plants. Chlorosis (yellowing) appears in 2 or 3 days and plant death occurs in about 2 weeks. For broadleaf weeds, weed control occurs through contact action. Weeds turn brown and die within 3 to 5 days. Thorough coverage is important for good results.

Effects of Growing Conditions:

Applications of Hoe-Grass II during periods of crop stress, when plants are not actively growing because of hot temperatures (above 28°C) or under very dry conditions or low humidity, may result in substantially reduced weed control. Under certain environmental conditions yellow blotches may appear on crop leaves. During periods of stress (above 28°C) or high humidity, flax may show leaf burn, retarded growth and a slight delay in maturity. Avoid spraying flax under these conditions.

Tank Mixes:

Herbicides: Hoe-Grass II may be tank mixed with MCPA amine (500 g/L) at the reduced rate of 0.028 L/acre to improve wild mustard control in wheat (spring and durum), barley (except Norbert, Glenn, Betzes or Klages), spring rye and triticale. Exceeding the recommended rate of MCPA amine 500 will result in a severe reduction in grassy weed control. Although registered, this tank mix is not recommended because of inconsistent results and possible antagonism of grassy weed control.

Fertilizers: None registered.

Insecticides: Hoe-Grass II may be tank mixed with Decis 5EC on wheat (spring and durum), barley and flax.

Allow a 4 day interval between application of Hoe-Grass II and other herbicides.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour will reduce control.

Grazing: Do not graze treated crops or cut for hay.

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze. Shake well before using.

Preharvest: Do not apply within 60 days of harvest.

Tank Cleaning:

Immediately after spraying Hoe-Grass II, run clean water/household ammonia through the tank, pump and lines. Circulate the solution through lines and nozzles. Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Horizon

Herbicide Group – 1
(Refer to page 20)

Company:

Syngenta

Formulation:

240 g/L clodinafop-propargyl formulated as an emulsifiable concentrate.

1 case contains 3.68 L of Horizon plus 2 x 6.4 L containers of Score adjuvant.

Crops:

Spring wheat (including durum).

Weeds and Staging:

Wild oats - 1 to 6 leaf stage, maximum 3 tillers.

Green and yellow foxtail - 1 to 5 leaf stage, prior to emergence of 3rd tiller.

Barnyard grass - 1 to 5 leaf.

Volunteer canaryseed - 1 to 6 leaf.

Persian darnel - 1 to 5 leaf stage and before tillering.

Volunteer oats - 3 to 6 leaf.

Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are controlled before tillering.

Crop Stage:

Apply before the emergence of the 4th tiller. When tank mixing, check broadleaf product description for additional restrictions.

Cost:

$16.21 (wild oat rate) (2000 suggested retail price).

Rates:

Wild oats, green and yellow foxtail, volunteer oats, barnyard grass, volunteer canaryseed: apply 0.095 L (95 mL)/acre (40 acres/case). Add Score adjuvant at a rate of 0.8 L per 100 L spray solution.

The above weeds plus persian darnel: apply 0.115 L (115 mL)/acre (32 acres/case). Add Score adjuvant at a rate of 1 L per 100 L spray solution.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 to 310 kPa (40 to 45 psi).

Nozzles:

80° or 110° flat fan stainless steel nozzles tilted forward at an angle of 45°.

How it Works:

Horizon is a systemic herbicide which is absorbed by leaves and is rapidly translocated to growing points of leaves and stems. Yellowing of leaves and growing points is usually visible in 1-3 weeks, with browning and death visible 3 to 5 weeks after application.

Effects of Growing Conditions:

For optimum results, apply Horizon to actively growing weeds. Do not apply to crops or weeds that are stressed by hot or cool conditions, frost, drought, low fertility, water-saturated soil, disease or insect damage as crop injury and poor weed control may result.

Tank Mixes:

Herbicides:

In spring wheat including durum (except where indicated) Horizon can be tank mixed with:

2,4-D amine (0.34 to 0.45 L/acre)
Ally (3 g/acre)
Attain* (40 acres/case)
Buctril M (0.40 L/acre)
Curtail M (0.80 L/acre)
Dichlorprop + 2,4-D (0.71 L/acre)
DyVel (0.50 L/acre)
Lontrel (0.11 to 0.17 L/acre) + MCPA 500 ester (0.45 L/acre)
MCPA amine or ester (0.34 to 0.45 L/acre- 500 g/L formulations)
Pardner (0.40 L/acre)
Prestige* (20 acres/case)
Refine Extra (8 g/acre)
Target (0.4 to 0.6 L/acre)
Thumper (0.40 L/acre)
Unity (40 acres/case)
* Not for durum wheat

Refer to the broadleaf herbicide label for crop staging, and other information. When tank mixing, always add the broadleaf herbicide first, followed by Horizon, with the Score adjuvant added last. Reductions in green foxtail and wild oat control may be observed when tank mixed with 2,4-D amine and MCPA amine.

Fertilizers: None registered.

Insecticides: Horizon can be tank mixed with Decis at 32 to 48 mL/acre prior to emergence of 4th crop tiller.

Restrictions:

Rainfall: Rainfall within 30 minutes may reduce control.

Grazing: Do not graze or harvest treated crops for forage within 3 days of application.

Preharvest: Do not apply within 60 days of harvest.

Recropping: No restrictions.

Storage: May be frozen.

Aerial Application: Do not apply by air.

Environment: Do not apply within 15 m of rivers, lakes, ponds, wetlands, sloughs, irrigation water, vegetated ditch banks, or water used for livestock or domestic purposes.

Tank Cleaning:

Thoroughly clean application equipment immediately after spraying. Ensure that all traces of the product are removed. Drain and flush tank walls, boom and all hoses for 10 minutes with clean water. Remove nozzles and screens and wash separately.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison
Warning Eye and Skin Irritant

Horizon BTM

Herbicide Group – 1, 6
(Refer to page 20)

Company:

Syngenta

Formulation:

Horizon 240 EC (240g/L clodinafop - propargyl formulated as an emulsifiable concentrate). Container size - 1.84 L

Buctril M (280g/L bromoxynil and 280g/L MCPA ester) formulated as an emulsifiable concentrate. Container size - 1.8 L

Horizon BTM adjuvant container size: 6.4 L

Each case treats 20 acres.

Crops:

Spring wheat (including durum).

Weeds Controlled and Staging:

Weeds controlled up to 4 leaf stage:

American nightshade
Bluebur
Ball mustard
Cocklebur
Cow cockle
Flixweed
Green smartweed
Kochia [2]
Lady's-thumb
Night-flowering catchfly
Pale smartweed
Redroot pigweed[1]
Russian thistle [2]
Scentless chamomile [3]
Shepherd's-purse
Volunteer canola
Volunteer sunflower

[1] May not be controlled in flax.
[2] Control before plants are 2 inches tall.
[3] Spring seedlings only.

Weed controlled up to 6 leaf stage:

Wild tomato

Weeds controlled up to 8 leaf stage:

Common groundsel
Common ragweed
Lamb's-quarters
Stinkweed
Tame buckwheat
Tartary buckwheat
Wild buckwheat
Wild mustard
Wormseed mustard

Weeds with top growth controlled:

Canada thistle
Perennial sow-thistle

Crop Stage:

From 2 leaf up to emergence of 4th tiller.

Cost:

$21.24/acre (2000 suggested retail price).

Rates:

0.405 L/acre Buctril M
0.092 L/acre Horizon
0.32 L/acre Horizon BTM adjuvant
One case treats 20 acres.

Add Buctril M first, followed by Horizon 240 EC with the Horizon BTM adjuvant added last.

Water Volume:

At least 40 L/acre (9 gallons/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

80° or 110° flat fan stainless steel nozzles tilted forward at an angle of 45°.

How it Works:

Clodinafop is a systemic herbicide which causes yellowing of leaves and growing points 1-3 weeks after application and death after 3-5 weeks. Bromoxynil is a contact herbicide and so good coverage is essential. Susceptible weeds turn brown and die in 3-5 days. MCPA is a systemic herbicide which may cause burn spots within hours of application and death within 14 days.

Effects of Growing Conditions:

For optimum results, apply to actively growing weeds and in humid conditions. Do not apply to crops or weeds that are stressed due to drought, frost, water logging, infertile conditions or disease or insect damage.

Tank Mixes:

Herbicides: Refer to individual labels for registered tank mixes.

Insecticides: None registered.

Fungicides: None registered.

Restrictions:

Rainfall: Within 1 hour may reduce control.

Grazing: Do not graze treated crops or cut for feed within 30 days of application.

Recropping: No restrictions the year after treatment.

Aerial application: Do not apply by air.

Tank Cleaning:

Thoroughly clean application equipment immediately after spraying. Ensure that all traces of the product are removed by draining and flushing tank walls with clean water for 10 minutes. Remove nozzles and screens and wash separately.

Do not clean equipment upslope of water bodies or ditches, cropland or shelterbelts. Clean equipment away from where others may frequent.

Hazard Rating:

Warning Poison.

Skin and Eye Irritant.

Kerb 50-W

Herbicide Group – 15
(Refer to page 20)

Company:

Rohm and Haas Canada Inc.

Formulation:

50 percent propyzamide formulated as a wettable powder.
Container size - 1.36 kg (3 x 454 g).

Crops:

Established crops:
alfalfa, bird's-foot trefoil, pasture.

Weeds:

Annual grasses
Chickweed
Foxtail barley
Orchardgrass
Quackgrass
Timothy
Wild oats

Caution:

Do not use on soils with more than 6 percent organic matter. Do not apply to soils prone to flooding.

Crop Stage:

Apply between October 1 and freeze-up.

Weed Stage:

Pre-emergence.

Cost:

$79.60 per kg (2000 suggested retail price).

Rates:

Established grass or grass/legume pastures for control of foxtail barley:
Brown, dark brown or gray wooded soils - 0.36 kg/acre.
Black soils - 0.45 kg/acre.
Application of Kerb to some grasses (e.g. fescues) may cause yield reductions. Do not apply to timothy, crested wheatgrass or meadow fescue.

Alfalfa and bird's foot trefoil:
Annual grasses, volunteer cereals, wild oat control - 0.71 kg/acre.
Quackgrass, orchardgrass, timothy, chickweed control - 0.91 to 1.32 kg/acre.
Dodder control - 1.3 kg/acre. Note that complete control may not be achieved.

Water Volume:

30 to 50 gallons/acre (135 to 225 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan.

How it Works:

Kerb enters weeds through root uptake. Weeds are killed by root inhibition and abnormal shoot development. Many weeds die before emergence.

Effects of Growing Conditions:

Dry soil conditions at time of weed emergence may result in reduced control. Approximately 3 inches of total precipitation is required for adequate activation. Best results when soil temperatures are low but above freezing.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Surface applications are most effective if followed by 0.5 to 1 inch (1.25 to 2.5 cm) of rain within 2 days of application.

Grazing: Do not graze or harvest for livestock feed within 60 days of application.

Recropping: Do not replant to crops within 1 year of treatment.

Aerial Application: No labelled restrictions. No information on effectiveness or crop injury concerns when applied by air.

Storage: Store in a cool, dry place.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Non-labelled crops may be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Laddok

Herbicide Groups – 5,6
(Refer to page 20)

Company:
BASF

Formulation:
200 g/L bentazon and 200 g/L atrazine formulated as a solution.
Container size - 10 L.

Crops:
Corn (grain, silage and seed).

Seed corn producers should consult the seed corn company regarding the tolerance of seed production lines to Laddok and oil concentrates.

Weeds:
Refer to Rates for a list of weeds controlled.

Crop Stage:
1 to 5 leaf stage.

Weed Stage:
Apply when weeds are at the height recommended in the rates table.

Cost:
$13.92 to $18.63/acre (2000 suggested retail price).

Rates:
Add Assist at 1.0 L per 100 L of spray solution.

ANNUAL WEEDS	1.21 L/ACRE inches	(cm)	1.62 L/ACRE inches	(cm)
Black nightshade			0.2 - 0.8	(0.5 - 2.0)
Buttercup			2 - 4	(5 - 10)
Cocklebur	3 - 7	(7.5 - 17.5)	7 - 12	(17.5 - 30.0)
Common chickweed			Apply 1 to 3 weeks after emergence	
Common groundsel			2 - 4	(5 - 10)
Common ragweed	1 - 1.5	(2.5 - 4.0)	1.5 - 3	(4.0 - 7.5)
Corn spurry			1 - 4	(2.5 - 10.0)
Giant ragweed			2 - 6	(5 - 15)
Hairy galinsoga			2 - 3	(5.0 - 7.5)
Lady's-thumb (smartweed)	1 - 3	(2.5 - 7.5)	3 - 8	(7.5 - 20.0)
Lamb's-quarters	1 - 2	(2.5 - 5.0)	2 - 4	(5 - 10)
Purslane			1 - 2	(2.5 - 5.0)
Redroot pigweed	0.7 - 1.2	(1.5 - 3.0)	1.2 - 1.5	(3 - 4)
Russian thistle			1 - 3	(2.5 - 7.5)
Venice mallow	1 - 2	(2.5 - 5.0)	2 - 4	(5 - 10)
Wild mustard	1 - 5	(2.5 - 12.5)	5 - 10	(12.5 - 25.0)
PERENNIAL WEEDS Yellow nutsedge	4 - 6	(10 - 15)	Rate: 1.21 - 1.62 L/acre (repeat 7 - 10 days if necessary)	

Water Volume:

20 to 40 gallons/acre (90 to 180 L/acre).

The higher recommended water volumes and pressures should be used for dense weed infestations or for weeds approaching the upper limit of their recommended stage for treatment.

Pressure:

275 to 300 kPa (40 to 45 psi).

Nozzles:

Flat fan nozzles capable of delivering high water volumes.

How it Works:

The bentazon component of Laddok is a contact herbicide which interferes with photosynthesis and is absorbed primarily through leaves. Weeds turn chlorotic (yellow) and then brown, usually within 2 weeks. The atrazine component of Laddok also inhibits photosynthesis and is absorbed through foliage and roots. It is translocated to areas of high transpiration, such as the edges of mature leaves, which become chlorotic (yellow) and then brown.

Effects of Growing Conditions:

Crop injury may occur if applications are made when crop is under stress because of prolonged cold weather, poor fertility or other factors; or when corn is wet and succulent from recent rainfall.

Best weed control is under warm, humid conditions.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within 6 - 8 hours of application will reduce control.

Grazing: Do not graze the treated crop or cut for hay prior to crop maturity.

Recropping: No restrictions the year following treatment when label rates for annual weeds have been used. Use of the double application for yellow nutsedge control may cause injury to rotational crops because of carryover of the Atrazine component of the product. Under particularly dry soil conditions, there may be greater carryover of the atrazine component of Laddok which could damage a number of different special crops. Refer to the "Atrazine" product description for information.

Aerial Application: No restrictions on label. No information on effectiveness or crop injury concerns when applied by air.

Storage: Do not freeze.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Non-labelled crops may be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Laser DF

Herbicide Groups – 1, 4, 2
(Refer to page 20)

Company:

Aventis CropScience

Formulation:

The Laser DF package contains 2 containers labelled "Greenfox" and 2 containers labelled "DF".

Greenfox contains 28 g/L fenoxaprop-p-ethyl and 336 g/L MCPA ester formulated as an emulsifiable concentrate. Container size - 10.1 L.

DF contains 75 percent thifensulfuron methyl formulated as a dry flowable. Container size - 162 grams.

Crops:

Laser DF alone may be used on spring wheat. Laser DF + 2,4-D ester may be used on Manitoba recommended varieties of durum wheat (Medora, Plenty, Scepter and Kyle). Do not use Laser DF on durum unless it is tank mixed with 2,4-D ester. If 2,4-D is not added, severe crop injury may result.

Crop Stage:

Spring wheat (not durum) - 2 to 6 leaf with a maximum of 3 tillers.

Durum wheat - 2 to 5 leaf with a maximum of 2 tillers.

Application to spring or durum wheat beyond these stages may result in crop damage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Grass weeds:

Green foxtail – 1 to 6 total leaves including tillers. Apply at the 2 to 3 leaf stage for optimum control.

Broadleaf weeds controlled at the 2-4 leaf stage unless otherwise indicated.

Annual sunflower
Burdock
Chickweed[2]
Cocklebur
Corn spurry[1]
Cow cockle[1]
Field horsetail
Flixweed
Green smartweed[1]
Hemp-nettle[1]
Hoary cress
Kochia
Lamb's-quarters[1]
Mustards (except dog and green tansy)
Plantain
Prickly lettuce
Ragweed
Redroot pigweed[1]
Russian pigweed
Russian thistle[1]
Shepherd's purse
Stinkweed[1]
Vetch
Volunteer canola[1]
Wild mustard[1]
Wild radish

[1] Controlled from colyledon to 4 inches (10cm) across
[2] 1 to 3 leaf stage

Weeds suppressed:

Canada thistle (up to 4 inches or 10 cm)

Cost:

$9.18/acre (2000 suggested retail price).

Rate:

Apply Greenfox at 0.51 L/acre and DF at 8 g/acre. One jug of Greenfox (10.1 L) and one container of DF (162 g) treats 20 acres.

When applying Laser DF to durum wheat, apply with 0.07 L/acre of 2,4-D LV600 (1.4 L treats 20 acres), or with 0.06 L/acre of 2,4-D LV700 (1.2 L treats 20 acres).

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Water Volume:

Spring wheat: 5 - 10 gallons/acre (23-45 L/acre).

Durum wheat: 10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

80° or 110° flat fan nozzles tilted forward at a 45° angle. Screens and filters 50 mesh or coarser.

How it Works:

Fenoxaprop-p-ethyl is a systemic herbicide that is translocated from treated leaves to growing points of green foxtail. Symptoms on green foxtail include reduced leaf growth and chlorosis (yellowing) of treated leaves within 1 to 3 days. Chlorosis progresses and plant death occurs 14 to 21 days after application. 2,4-D is absorbed through the leaves and roots and is translocated throughout the plant. Susceptible weeds exhibit bending and twisting and die in 2 to 3 weeks. DF is slow to act and symptoms, which include discolouration (reddening, purpling or yellowing), may not be noticeable for 1 to 3 weeks after application.

Effects of Growing Conditions:

Do not apply to crop that is stressed by heat, frost, low fertility, drought, water-saturated soil, disease or insect damage as crop injury and/or poor weed control may result. Poor weed control will result if weeds are too large, if coverage is poor or if weeds are not actively growing.

Tank Mixes:

Herbicides: 2,4-D LV ester (durum wheat).
Spring wheat (not including durum) Laser DF may be tank mixed with Lontrel at 0.085 L/acre for season long control of Canada thistle up to 6 inches (15 cm) in height.

Fertilizers: None registered.

Insecticides: None registered.

An interval of 7 days prior to application, or 4 days after application of Laser DF, is required before any other pesticide can be applied.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 2 hours of application will reduce control.

Grazing: Do not graze or cut treated crops for forage prior to crop maturity.

Preharvest: Do not apply within 70 days of harvest.

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze. If stored for 1 year or longer, shake well before using.

Environment: Do not apply within 15 m of a body of water or wetland area.

Tank Cleaning:

The "DF" (thifensulfuron) component of Laser DF can cause severe injury to sensitive crops at very low concentrations. Sprayers used to apply Laser DF should be flushed out immediately after Laser DF is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1 L of 3 percent ammonia per 100 L water) prior to using the sprayer on sensitive crops. All nozzles, screens and filters should be removed and cleaned after applying this product. Refer to product label for detailed cleaning instructions.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Danger Poison

Liberty

Herbicide Group – 10
(Refer to page 20)

Company:

Aventis CropScience

Formulation:

150 g/L glufosinate ammonium formulated as an emulsifiable concentrate.

Container sizes - 13.5 L, 108 L.

Crops:

Liberty Link canola only for in crop use.

Dessication of alfalfa (seed production only), lentils*, potato* prior to harvest.

*Not for crops grown for seed production.

Crop Stage:

Liberty Link Canola - cotyledon to bolting stage. Temporary crop discolouration (bronzing) may be observed after application.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Desiccation:
Alfalfa - 50 to 75% pod turn (brown)
Lentil - 40 to 60% pod turn (yellow to brown)
Potatoes - 14 to 21 days prior to harvest.

Weed Staging:

The stages listed refer to the 1.35 L/acre rate of Liberty. Note that weed staging may differ at lower rates. Refer to the product label for details.

WEED	STAGE
Wild oats, volunteer wheat, volunteer barley	1 to 4 leaf stage with a maximum of 2 tillers
Green foxtail	1 to 6 leaf stage with a maximum of 3 tillers
Cleavers	1 to 2 whorls
Wild buckwheat, stork's-bill	1 to 3 leaf stage
Chickweed, redroot pigweed, quackgrass, cow cockle, barnyard grass, round leaved mallow, volunteer canola	1 to 4 leaf stage
Wild mustard	1 to 5 leaf stage
Smartweed, lamb's quarters, shepherd's purse	1 to 6 leaf stage
Stinkweed, perennial sow-thistle	1 to 8 leaf stage
Hemp-nettle	2 to 8 leaf stage (1 to 4 leaf pairs)
Volunteer flax	Up to 2.5 inches (6 cm) in height
Russian thistle, kochia	Up to 3 inches (8 cm) in height)
Canada thistle, flixweed, scentless chamomile	Up to 4 inches (10 cm) in height
Dandelion	Rosettes up to 6 inches (15 cm) in diameter

Rates and Weeds Controlled:

WEED (L/ACRE)	RATE PER 13.5 L CONTAINER	ACRES TREATED
Wild mustard, smartweed, green foxtail, lamb's quarters, stinkweed, Russian thistle, volunteer flax, cow cockle, barnyard grass, volunteer canola	0.81	16.6
Perennial sow-thistle, chickweed, redroot pigweed, shepherd's purse, kochia, scentless chamomile, round leaved mallow Light[1] infestations of volunteer wheat, volunteer barley (suppression only), wild buckwheat Hemp-nettle (1 to 3 leaf pairs) Quackgrass (top growth suppression) Canada thistle (top growth suppression)	1.1	12.4
Volunteer wheat, volunteer barley (suppression only), wild oat, cleavers, wild buckwheat, dandelion, stork's-bill, flixweed Hemp-nettle (1 to 4 leaf pairs) Quackgrass (season long control, light[1] infestations) Canada thistle (top growth suppression)	1.35	10
Quackgrass (season long control) Canada thistle (enhanced top growth suppression)	1.6	8.3

[1] The company does not provide guidelines for weed densities under light infestations. When in doubt as to the infestation level, use the high rate or contact the manufacturer.

A second application can be made to fields that were treated initially with up to 1.35 L/acre. Apply Liberty at a rate of 0.8 to 1.35 L/acre in the second application.

Desiccation Rates:

Alfalfa - 1.09 L/acre
Lentil - 0.81 to 1.09 L/acre
Potato - 1.21 L/acre

Cost:

$16.76 per L (2000 suggested retail price).

Water Volume:

Ground applications: 10 gallons/acre (45 L/acre).

Aerial applications (desiccation use only): 3 to 5 gallons/acre (13 to 22 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Ground Application: 80° or 110° stainless steel flat fan nozzles tilted forward at an angle of 45°.

Aerial applications (desiccation use only): Do not use raindrop nozzles. Use a combination of nozzles and pressure to provide coarse droplet size distribution.

How it Works:

Liberty is a contact herbicide that is absorbed through foliage. Yellowing and wilting occur 2 to 5 days after application, leading to general browning and plant death 1 to 2 weeks after treatment.

Effects of Growing Conditions:

Liberty activity is influenced by environmental conditions. Cool temperatures (less than 10°C), drought, and low humidity conditions slow weed growth. Applications made under these stressed conditions may result in reduced weed control.

Tank Mixes:

Herbicides:
In Liberty Link canola, Liberty may be tank mixed at 1.1 - 1.35 L/acre with Select at 0.0255 L (25.5 mL)/acre for enhanced control of wild oat and volunteer barley. Consult Liberty label for exact weed control options. Add Amigo at 0.5 L per 100 L spray solution.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 4 hours may reduce control.

Grazing: Do not graze the treated crop or cut for feed prior to crop maturity.

Recropping: No restrictions.

Aerial Application: Apply by air for desiccation treatments only.

Storage: Do not freeze.

Environment: Do not apply within 15 m of environmentally sensitive areas.

Tank Cleaning:

Before and after using Liberty, complete a thorough cleaning of the spray tank, lines and filter. The manufacturer recommends that all traces of Liberty be removed from spraying equipment by flushing with a water/household ammonia mixture (1 L of 3% of ammonia per 100 L water).

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison
Skin and Eye Irritant

Linuron

Herbicide Group – 7
(Refer to page 20)

Company/Products:

Aventis CropScience (Afolan F)
DuPont Canada Inc. (Lorox Toss-N-Go)
United Agri Products (Linuron 480)

The following recommendations are a blend of recommendations of all Linuron products. Consult the individual product labels for specific recommendations.

Formulations:

Afolan F/Linuron 480 - 480 g/L linuron formulated as a flowable. Container size - 10 L.

Lorox Toss-N-Go - 50 percent linuron formulated as a dry flowable. Container size - 5 water soluble bags (500 g each, total 2.5 kg).

Crops:

Post-emergent: - Spring wheat (including durum), oats and barley - only when tank mixed with MCPA amine.
- Caraway, coriander (Afolan F only).

Pre-emergent surface: Soybean, potatoes, sweet white lupins.

Pre-emergent and post-emergent directed spray: field corn.

Shelterbelts (caragana, green ash, Siberian and American elm, Manitoba maple, poplar, willow, white spruce, Colorado spruce, Scots pine).

Weeds:

When tank mixed with MCPA amine in cereals, the following weeds are controlled:

Ball mustard
Chickweed
Cocklebur
Common burdock
Common ragweed
Cow cockle
Field horsetail
  (suppression only)
Giant ragweed
Goat's-beard
Green foxtail
  (suppression only)
Green smartweed
Kochia
Lady's-thumb
Lamb's-quarters
Prickly lettuce
Prostrate pigweed
Redroot pigweed
Russian pigweed
Shepherd's-purse
Stinkweed
Stork's-bill
Tartary buckwheat
Tumble mustard
Wild buckwheat

Hare's ear mustard
Hemp-nettle
Indian mustard
Wild mustard
Wild radish
Wormseed mustard

Pre-emergent surface treatments: Annual sow-thistle, barnyard grass*, common chickweed, common ragweed, crabgrass, goosefoot, green and yellow foxtail, knotweed, lamb's quarters, purslane, redroot pigweed, shepherd's-purse, smartweed, stinkweed, wheat, wild buckwitchgrass, wormseed mustard.

*partial control

Afolan F is registered for wild mustard control only when applied alone in caraway and coriander.

Crop Stage:

Wheat, barley and oats - 2 to 4 leaf stage.

Field corn - apply when corn is at least 15 inches (38 cm) high (highest leaf on free standing plant).

Established shelterbelts (one year old). Apply as an overall spray to dormant stock or as a directed spray if buds have broken.

Caraway, coriander - 2 to 4 leaf stage.

Soybeans, sweet white lupin, potatoes - Pre-emergent surface treatments (after planting but prior to crop emergence). Sufficient moisture (1 to 2 inches or 3 to 5 cm) in the form of rainfall or irrigation is necessary within 7 to 10 days of application or poor weed control will result. Seed the crop at least 2 inches (5 cm) deep.

Make only one application per year to field crops.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

Apply when annual broadleaf weeds are in the 2 to 4 leaf stage and when green foxtail is in the 1 to 3 leaf stage.

In shelterbelts, apply when weeds are less than 4 inches (10 cm) tall.

Costs:

$27.30 per L (2000 suggested retail prices).

Rates:

Post-emergent applications only:

CROP	AFOLAN F (L/acre)	LINURON 480 (L/acre)	LOROX (kg/acre)
Cereals (with 0.45 L/acre MCPA amine 500 g/L)	0.19 - 0.24	0.17 - 0.22	0.17 - 0.22
Field corn (post-emergent* directed spray)	1.01 - 1.90	0.97 - 1.82	0.93 - 1.74
Shelterbelts	1.9 - 3.8	1.8	1.7

*Use lower rate when weeds do not exceed 2 inches (5 cm) and higher rate for weeds up to 8 inches (20 cm) in height, preferably before they are 5 inches (13 cm) high.

For caraway and coriander, apply 0.51 to 0.67 L/acre of Afolan F **(do not apply with MCPA)** for control of wild mustard only.

Pre-emergent surface applications for use on loam to clay soils only:

PRODUCT	AFOLAN F (L/acre)		LINURON 480 (L/acre)		LOROX (kg/acre)	
Organic matter	less than 3%	from 3 - 5%	less than 2%	from 2 - 5%	less than 2%	from 2 - 5%
Field corn	1.01 - 1.52	1.52 - 1.90	0.91[1]	1.31[1]	0.30[2]	0.61[2]
Soybeans	1.01 - 1.52	1.52 - 1.9	0.91 - 1.31	1.31 - 1.82	0.91 - 1.31	1.31 - 1.82
Sweet white lupins	N/A	N/A	0.85	1.25	0.81	1.21
Potatoes	1.01 - 1.52	1.52 - 1.9	0.91	1.82	0.89	1.74

[1] Must be tank mixed with Atrazine 80W. Refer to label for tank mixes with Dual II and/or Primextra.

[2] Must be tank mixed with Dual II Magnum + Atrazine or Primextra.

If used on sandy soils, severe crop injury may result.

Water Volume:

Post-emergent: (Cereals) - 10 gallons/acre (45 L/acre).

Pre-emergent surface: 20 to 30 gallons/acre (90 to 135 L/acre)

Shelterbelts - 20 to 40 gallons/acre (90 to 180 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Stainless steel, flat fan nozzles with 50-mesh (or coarser) line strainers and screens.

How it Works:

Linuron is a systemic herbicide which is absorbed through both the foliage and the root system of the plant. Once in the plant, it strongly inhibits photosynthesis. Affected plants appear chlorotic (yellowed) and stunted, and death occurs 10 to 14 days after treatment.

Effects of Growing Conditions:

In post-emergent applications the best weed control occurs when temperatures are moderate, when relative humidity is high and when soil moisture is adequate. Injury to cereals (crop lightening) will occur when the crop is under stress because of drought or disease. This injury is worse when the product is applied at advanced leaf stages.

In pre-emergent surface treatments, rainfall or irrigation (1 to 2 inches or 3 to 5 cm) is required to move linuron into the root zone of germinating seeds. Insufficient moisture will result in poor weed control. Drought conditions after application will result in little to no weed control. If rainfall does not occur within 7 to 10 days of application and prior to crop emergence, a shallow rotary hoeing (0.75 to 1.5 inches/2 to 4 cm) should be made to mix the top layer of soil to help activation. Avoid covering treated ground with untreated soil. If unusually heavy rain follows application, severe crop injury may result from herbicide in the root zone of the crop. Do not use on sandy soils or severe crop injury will result.

Tank Mixes:

Herbicides: For post-emergent applications in cereals, linuron must be tank mixed with MCPA amine. Do not tank mix with other herbicides.

Do not tank mix Afolan F when applied to coriander and caraway.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crops or cut for feed prior to crop maturity.

Recropping: If the intended crop fails, fields treated with Pre-emergent surface applications of linuron, may be seeded back to corn, soybeans, sweet white lupins, or potatoes. Till the soil throughly before reseeding. No restrictions 1 year after treatment.

Aerial Application: No labelled restrictions. No information available on effectiveness or crop injury concerns when applied by air.

Storage: Do not store Afolan F at temperatures below 5°C. Lorox DF may be frozen.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make a recommendation.

Non-labelled crops may be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Lontrel

Herbicide Group – 4
(Refer to page 20)

Company:

Dow AgroSciences

Formulation:

360 g/L clopyralid formulated as a solution.

Container size - 4.45 L.

Crops:

Canola
Barley
Flax (not including Solin - low linolenic varieties)
Oats
Spring wheat (including durum)
Summerfallow.

Seedling and established grasses for forage and seed production including:

Altai wild ryegrass
Creeping red fescue
Crested wheatgrass
Intermediate wheatgrass
Kentucky bluegrass
Meadow fescue
Meadow foxtail
Orchardgrass
Reed canarygrass
Slender wheatgrass
Smooth brome-grass
Streambank wheatgrass
Tall fescue
Tall wheatgrass (for forage only)
Timothy
Russian wild ryegrass

Weeds:

Alsike clover
Canada thistle
Common groundsel
Perennial sow-thistle (top growth only)
Scentless chamomile
Volunteer alfalfa
Wild buckwheat

Crop Stage:

Barley, wheat (spring and durum), oats - 3 to flag leaf stage.

Seedling forage grasses - 2 to 4 leaf stage.

Established grasses - at the shot blade stage, or in the fall after harvest or in early spring.

Flax - 2 to 4 inches (5 to 10 cm) in height.

Canola - 2 to 6 leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

Annual weeds - 2 to 4 leaf stage; Canada thistle - after all thistles have emerged and when the majority are in the rosette to pre-bud stage; volunteer alfalfa - 2 to 20 inches (5 to 50 cm) in height.

Cost:

$23.30 to $46.61/acre (2000 suggested retail price).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan.

Rates:

CROP	RATE (L/ACRE)	ACRES TREATED PER 4.45 L CONTAINER
Rapeseed (canola)	0.17 - 0.34	26.2 - 13.1
Flax	0.23 - 0.34	19.3 - 13.1
Barley, oats, wheat	0.17 - 0.23	26.2 - 19.3
Summerfallow	0.34	13.1
Seedling and established grasses (see list under "Crops")	0.17 - 0.34	26.2 - 13.1

0.17 L/acre - Provides top growth control of Canada thistle for 6 to 8 weeks.

0.23 L/acre - Provides season long control of Canada thistle. Not all root stalks will be killed and some regrowth may occur by the end of the growing season.

0.34 L/acre - Provides season long control of Canada thistle with suppression into the following year.

How it Works:

Lontrel is a growth regulator type herbicide which is absorbed through leaves and stems and is translocated to all parts of the plant. Symptoms include swollen growing points and roots, twisted stems and leaves, and a gradual discoloration from green to yellow to brown. Susceptible plants die in 2-3 weeks.

Effects of Growing Conditions:

Poor control may occur under dry conditions. Injury to flax may occur when tank mixing with MCPA. To reduce the risk of crop injury do not apply tank mixes if temperature exceeds 27°C.

Tank Mixes:

Herbicides:
Lontrel applications following applications of products containing bromoxynil (Buctril M, Compas 480 EC, Pardner, Thumper, Hoegrass II) should be delayed by 14 days to allow the Canada thistle to recover from leaf burn.

Canola:
Poast Ultra
Fusion (Lontrel at 0.23 L/acre)
Hoegrass 284 (Lontrel at 0.17 L/acre)
Roundup Original[1]/Transorb[1] (Lontrel at 0.112 L/acre)
Odyssey[2] (Lontrel at 0.17 to 0.23 L/acre)
Select
Vantage[1]/Vantage Plus[1] (Lontrel at 0.112 L/acre)
Venture DG

[1] Roundup Ready varieties only
[2] CLEARFIELD varieties only

Flax (Lontrel at 0.17 L/acre):
MCPA amine or ester - 0.34 to 0.45 L/acre (500 g/L formulation)
Poast Ultra
Poast Ultra + MCPA Ester (rates as above)
Select

Spring wheat (NOT including durum) and barley (Lontrel at 0.085 L/acre)
Refine Extra (8 g/acre) + 2,4-D (0.28 L/acre - 600g/L formulation) plus non-ionic surfactant.
Refine Extra (8 g/acre) + MCPA (0.34 L/acre - 500g/L formulation) plus non-ionic surfactant.
Triumph Plus - 20 acres per case

Oat (Lontrel at 0.11 to 0.17 L/acre)
MCPA amine or ester

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Crops or areas treated with this product may be grazed immediately following treatment.

Recropping: Lontrel residues in the soil may affect succeeding crops. The year after application, replant to wheat, barley, oats, rye, flax, forage grasses, mustard or canola. Do not sow potatoes into fields treated with Lontrel until the third growing season after the year of treatment. Do not use manure from animals fed or bedded with Lontrel-treated straw except on fields that are to be sown to Lontrel-tolerant crops.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Non-labelled broadleaf crops may be severely injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

MCPA

Herbicide Group – 4
(Refer to page 20)

Company:

Various. Application details may differ with different product labels. Consult specific product labels for more information.

Formulations:

500 g/L amine, 300 g/L sodium salt and 400 g/L potassium salt formulated as solutions; 564 and 500 g/L ester formulated as emulsifiable concentrates.

Container size - various.

Weeds:

Susceptible weeds controlled by MCPA amine and ester in cereals include:

Burdock
Cocklebur
Flixweed[2]
Kochia
Lamb's-quarters
Mustards (except dog)
Prickly lettuce
Ragweed
Russian pigweed
Shepherd's purse[2]
Stinkweed[2]

Harder to control weeds for MCPA amine and ester in cereals include:

Annual sow thistle[1]
Bluebur
Blue lettuce[1]
Canada thistle[1]
Common peppergrass
Curled dock
Dog mustard
Goosefoot
Hemp-nettle (suppression only)
Leafy spurge[1]
Perennial sow thistle[1]
Redroot pigweed
Russian thistle[1]

[1] Top growth control only.
[2] Spring seedlings.

Weed Stage:

2 to 4 leaf stage. Winter annual control in late fall - rosette stage.

Crop Stage:

CROP	STAGE
Wheat (spring and	3 leaf to early flag leaf. durum), barley, oats
Spring rye	2 leaf to early flag leaf.
Fall rye	Spring application only. Apply after growth commences in the spring, but before the early flag leaf stage.
Winter wheat	In spring, apply from the time winter wheat growth commences until the early flag leaf stage. May be treated in the fall for winter annual weed control (caution: this is not a registered treatment, any such use is at the risk of the user).
Flax	2 inches (5 cm) in height to prebud stage. Apply at 2 to 4 inches (5 to 10 cm) in height for maximum crop tolerance.
Peas	Vines 4 to 7 inches (10 to 18 cm) long. For short-statured, determinate flowering peas, apply at the early stages within this range.
Underseeded alfalfa (except Flemish varieties), alsike clover, red clover	Apply when the majority of seedling legumes are in the 1 to 3 trifoliate leaf stage.
Grass pastures	Spring or fall.
Seedling forage grasses[1] (not for seed)	Apply from the 3 leaf stage to the shot blade stage.
Established forage grasses[1] (not for seed)	Apply in the spring up to the shot blade stage or in the fall after harvest.

[1] MCPA is not registered for use on forage grasses, any such use is entirely at the risk of the user.

Crops and Rates:

CROP	MCPA AMINE (500 g/L) L/ACRE	MCPA ESTER (500 g/L) L/ACRE	MCPA K (400 g/L) L/ACRE	MCPA SODIUM SALT (300 g/L) L/ACRE
Spring wheat, barley, oats	0.28 to 0.71[1]	0.28 to 0.71[1]	0.65 to 0.81	0.51 to 1.11[4]
Spring rye	0.28 to 0.71[1]	0.28 to 0.71[1]	Not registered	0.51 to 1.11[4]
Flax	0.28 to 0.45[2]	0.28 to 0.45[2]	0.65 to 0.81	0.51 to 1.11[4]
Winter wheat, fall rye	0.22 to 0.45	0.22 to 0.45	Not registered	0.51 to 1.11[4]
Corn	0.30 to 0.51	Not registered	Not registered	0.40 to 0.61
Peas	0.13 to 0.22	Not registered	Not registered	0.36[3]
Cereals underseeded to alfalfa (not Flemish varieties), red and alsike clover - for emergency use only	Not registered	Not registered	Not registered	0.40
Grass pastures	0.81 to 1.42	0.81 to 1.42	Not registered	Not registered
Seedling forage grasses (not for seed)	Up to 0.45[5]	Not registered	Not registered	Not registered
Established forage grasses (not for seed)	Up to 0.90[5]	Not registered	Not registered	Not registered

Use the higher rates for harder to kill weeds, for dry or cool weather conditions, or when weed infestations are heavy.

[1] Rates above 0.45 L/acre may cause crop injury.

[2] Rates above 0.34 L/acre may cause crop injury.

[3] This rate is lower than the registered rates for peas. Less than the maximum label rates are recommended because of crop injury concerns.

[4] Rates above 0.81 L/acre may cause crop injury.

[5] MCPA is NOT registered for use on forage grasses, any such use is entirely at the risk of the user.

Formulation Characteristics:

Formulation	Risk of Vapour Drift	Activity on Weeds	Risk of Crop Injury
LV Ester	Medium	Fast	Medium
Amine	Very Low	Medium	Low
Salts	Very Low	Slow	Very Low

Cost:

MCPA amine - $6.10- $6.95 per L (500 g/L formulation)

MCPA ester - $7.05 per L (500 g/L formulation)

MCPA sodium salt - $4.85 per L (300 g/L formulation)

MCPA K - $5.40 - $5.86 per L (400 g/L formulation)

(2000 suggested retail prices).

Water Volumes:

Cereals, flax, pastures, forage grasses - 10 to 20 gallons/acre (45 to 90 L/acre).

Peas - 15 gallons/acre (70 L/acre).

Cereals underseeded to alfalfa, red and alsike clover - 15 to 20 gallons/acre (70 to 90 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

How it Works:

MCPA is a systemic herbicide that is absorbed through foliage and roots and is translocated to actively growing areas within the plant. Symptoms include bending and twisting of leaves and stems within 2 to 7 days, followed by browning and plant death 3 to 4 weeks after application.

Effects of Growing Conditions:

Best weed control occurs when temperatures are above 21°C and humidity is above 70 percent. Do not apply if temperature exceeds 27°C. If applying to flax, injury and a delay in maturity may result from application under hot or humid conditions. Extremely hard water may reduce performance or cause problems in spraying the product.

Tank Mixes:

Herbicides: See table. Not all brands are labelled for tank mixing. Check the product label prior to use. Follow all precautions and restrictions on both labels.

Fertilizers: None registered.

Insecticides: May be tank mixed with Decis, Lorsban or Pyrinex.

Fungicides: Certain formulations may be tank mixed with Tilt. Refer to the Tilt label for details.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Herbicide Tank Mixes:

CROP	MCPA AMINE	MCPA ESTER	MCPA K	MCPA SODIUM
Wheat	Accord, Ally, Banvel II, Buctril M, Horizon, linuron, Lontrel, Pardner, Puma^{120} Super, Puma Super, Refine Extra, Sencor, Stampede EDF	Accord, Achieve, Ally, Assert, Avenge, Buctril M, Lontrel, Pardner, Harmony Total, Horizon, Refine Extra, Puma^{120} Super, Puma Super, Sundance, Stampede EDF	Banvel II, Buctril M, Pardner	Buctril M
Barley	Ally, Banvel II, Buctril M, linuron, Lontrel, Pardner, Puma^{120} Super, Refine Extra, Sencor	Achieve, Ally, Assert, Avenge, Buctril M, Lontrel, Pardner, Puma^{120} Super, Puma Super, Refine Extra, Stampede EDF	Banvel II, Buctril M, Pardner	Buctril M
Oats	Banvel II, Buctril M, linuron, Lontrel, Pardner, Puma^{120} Super, Refine Extra	Buctril M, Lontrel, Pardner, Refine Extra, Stampede EDF	Banvel II, Buctril M, Pardner	Buctril M
Fall rye	Pardner	Pardner	Pardner	None
Winter wheat	Pardner, Refine Extra	Avenge, Refine Extra	Pardner	None
Flax	Fusion, Lontrel	Poast Ultra, Fusion, Select, Lontrel, Stampede EDF	None	None
Peas	Not recommended	Not recommended	Not recommended	Sencor

Restrictions:

Rainfall: Within 6 hours of MCPA sodium salt or MCPA K, 4 hours of MCPA amine, or 2 hours of MCPA ester application will reduce control.

Grazing: Do not graze within 7 days of application.

Recropping: No restrictions the year after application.

Aerial Application: Some amine and MCPA K products may be applied by air. Check the label for detailed instructions.

Storage: MCPA ester may be frozen. Do not freeze MCPA amine, MCPA sodium salt and MCPA K.

Tank Cleaning:

Sprayers used to apply MCPA should be flushed out immediately with a water/household ammonia rinse (1 L of 3 percent ammonia per 100 L of water).

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison

MCPB + MCPA

Herbicide Group – 4
(Refer to page 20)

Company:

IPCO (Clovitox Plus)
Nufarm (Tropotox Plus)

Formulation:

375 g/L MCPB, 25 g/L MCPA formulated as a solution.

Container size - 10 L.

Crops:

Registered for both Tropotox and Clovitox:
Clover
Peas
Pastures
Seedling alsike

Red clover or white Dutch clover sown alone or with a barley, wheat, rye or oat companion crop.

Registered for Tropotox only:
The following seedling grasses:
Bromegrass (smooth, meadow)
Fescue (creeping red, meadow, tall)
Green needlegrass
Reed canarygrass
Timothy
Wheatgrass (crested, intermediate, northern, pubescent, slender, streambank, tall, western)
Wild ryegrass (altai, Russian)

Weeds:

Weeds controlled:
Ball mustard
Bull thistle
Canada thistle
Curled dock
Lamb's-quarters
Plantains
Ragweed
Volunteer canola
Redroot pigweed
Shepherd's-purse
Stinkweed
Wild mustard
Wormseed mustard

Suppressed:
Annual sow-thistle
Hemp-nettle
Wild radish

Top growth suppressed:
Creeping buttercup
Field bindweed
Horsetail
Perennial sow-thistle
Tall buttercup

Crop Stage:

Peas - When plants have 3 to 6 expanded leaves.

Clover (seed crops only) - Apply between the 1 to 3 trifoliate leaf stage.

Oats, wheat, rye or barley companion crop - Between 2 leaf and flag leaf stage.

Seedling grasses - 2 to 4 leaf stage.

Weed Stage:

2 to 4 leaf stage for annual weeds. See label for specific perennial weed staging.

Cost:

$12.76 to $19.78 (2000 suggested retail prices).

Rate:

To control wild mustard, ball mustard, wormseed mustard, stinkweed and lamb's quarters, use 1.11 L/acre. For heavy weed infestations, and for control of other labelled weeds, or if cool, dry conditions prevail, apply 1.72 L/acre.

Do not exceed 1.4 L/acre on seedling grasses.

Water Volume:

15 to 20 gallons/acre (70 to 90 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

How it Works:

MCPB + MCPA is a systemic herbicide that is absorbed through foliage and roots and is translocated to actively growing areas within the plant. Symptoms include bending and twisting of leaves and stems within 2 to 7 days, followed by browning and plant death 3 to 4 weeks after application.

Effects of Growing Conditions:

Damage to peas or seedling forage legumes may occur if the crop is sprayed when under drought or disease stress. Under extremely hot or humid conditions, crop injury may be severe. Best activity on weeds occurs in warm weather.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crop or cut for hay in the year of establishment. Do not use treated cereals for grazing or cut for greenfeed until 30 days after application.

Recropping: No restrictions listed. Phenoxy herbicides can persist in soils for weeks, particularly if dry or cool weather persists. Do not seed sensitive crops immediately after spraying.

Aerial Application: No labelled restrictions.

Storage: Do not freeze.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Non-labelled broadleaf crops can be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Danger Poison

Mecoprop

Herbicide Group – 4
(Refer to page 20)

Company:

United Agri-Products (Mecoprop)
Nufarm (Compitox)

Formulation:

150 g/L mecoprop present as potassium salt. Container size - 10 L.

Crops:

Spring wheat (including durum), barley and oats.

Weeds:

- Black medic
- Canada thistle
  - (top growth control only)
- Chickweed
- Cleavers
- Clover (volunteer)
- Corn spurry
- Lamb's-quarters
- Plantain
- Wild mustard

Crop Stage:

3 leaf to flag leaf stage.

Weed Stage:

2 to 4 leaf stage. (Mecoprop)
3 to early flag stage (Compitox)

Cost:

$13.20 to $16.80/acre (2000 suggested retail price).

Rates:

2.2 to 2.8 L/acre. Use the high rate for weeds in an advanced stage of growth.

Water Volume:

20 to 30 gallons/acre (90 to 135 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

How it Works:

Mecoprop is a systemic herbicide that is absorbed through foliage and roots and is translocated to actively growing areas within the plant. Symptoms on susceptible weeds include bending and twisting of leaves and stems within 2 to 7 days, followed by browning and plant death 3 to 4 weeks after application.

Effects of Growing Conditions:

Apply in warm weather under good growing conditions. Avoid spraying in very hot weather or in drought conditions.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze or feed treated crop to livestock prior to crop maturity.

Recropping: No restrictions the year after application.

Aerial application: Not registered.

Storage: Do not freeze.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Tank Cleaning:

The manufacturer does not provide information on tank cleaning. Generally, a mixture of water and household ammonia (1 L per 100 L of water) flushed twice through the tank and circulated through the lines and nozzles is an effective method of cleaning the sprayer tank.

Hazard Rating:

Caution Poison

Muster Gold/Muster Gold II

Herbicide Group – 1, 2
(Refer to page 20)

Company:

DuPont Canada Inc.

Formulations:

Muster Gold/ Muster Gold II contains 3 components each:

Muster - 75 percent ethametsulfuron-methyl as a water dispersible granule. Container size - 2 x 80 g water soluble bags (Muster Gold)/ 4 x 80 g water soluble bags (Muster Gold II)

Assure/Assure II - 96 g/L quizalofop ethyl/quizalofop-p-ethyl as an emulsifiable concentrate. Container size - 8 L (both products).

Sure-mix adjuvant. Container size - 8 L

Merge adjuvant. Container size - 8 L (Muster Gold II only)

Crop:

Canola, including all herbicide tolerant canola varieties.

Weeds:

Grasses:

Barnyard grass
Green foxtail
Quackgrass (suppression)
Volunteer cereals
Volunteer corn
Wild oat

Broadleaf weeds:

Flixweed
Hemp-nettle
Redroot pigweed (suppression)
Stinkweed
Wild mustard
Smartweed (lady's-thumb)

Crop Stage:

2 leaf stage to the beginning of bolting. If application is made prior to this stage, severe crop injury may occur.

Weed Stage:

Annual grasses: 2 leaf to early tillering.

Quackgrass: 2 - 6 leaf stage.

Stinkweed: 1 - 4 leaf stage.

For optimum control, apply Muster Gold/Muster Gold II at the cotyledon to 6-leaf stage of the target broadleaf weeds.

For best results on volunteer cereals/wild oats apply before tillering begins.

Cost:

$19.95/acre (2000 suggested retail price)

Rates:

A box of Muster Gold will treat 20 acres (8 ha). A box of Muster Gold II will treat 40 acres (16 ha).

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 gallon/acre (45 L/acre)

Pressure:

210 to 275 kPa (30 to 40 psi)

Nozzles:

Flat fan nozzles with 50 mesh line strainers and screens.

How it Works:

Assure/Assure II is a systemic herbicide rapidly absorbed and readily translocated from the treated foliage to the root system and growing points. Symptoms in grasses are reduced growth and chlorosis (yellowing) of new leaves within 1 to 2 weeks of application, eventually resulting in death of the plant. Muster is absorbed by the foliage and roots and inhibits plant growth. Discolouration (yellowing, reddening and purpling) of susceptible plants is noticeable within 1-2 weeks of application. Eventually discolouration progresses to plant death.

Effects of Growing Conditions:

Crop injury and reduction in control may occur if plants are under stress as a result of drought, frost, flooding, disease or insect injury. Less than acceptable control will occur on fields where high weed populations exist and where stressful environmental conditions prevail (drought, cold weather). Heavy rainfall soon after application may result in visual crop injury or possible yield reduction. Thin crop stands or application prior to the 2 leaf stage, sandy soils or soils with low organic matter may increase the severity of the injury.

Restrictions:

Rainfall: Rainfall within 4 hours will reduce control.

Grazing: Do not graze or feed crop to livestock within 60 days of application.

Recropping: Interval prior to planting:

10 months - spring wheat, durum wheat, barley, flax, oats.

22 months - alfalfa, canarygrass, canola, drybeans, fababeans, fescue, lentils, peas, red clover, tame mustard. All other crops, a field bioassay is required at 22 months.

Aerial Application: Do not apply by air.

Storage: Store in a cool dry place

Environment: Do not mix or load within 30 m of wetland areas or bodies of water. Leave a 15 m buffer between the last spray pass and wetland areas or water bodies. Leave a 5 m buffer between the last spray pass and woodlots, shelterbelts, ditch-bank vegetation and the borders of dry sloughs.

Tank Cleaning:

To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill the tank with water while adding 1 litre of household ammonia (minimum 3 percent ammonia) for every 100 L of water. Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes. Again flush hoses, boom and nozzles with the cleaning solution, and then drain the tank. Remove and clean the nozzles and screens separately in a bucket containing a 1 percent solution of ammonia in water (1 L of 3 percent ammonia in 100 L water). If the spray equipment is to be used to spray crops other than cereals, repeat the above process and thoroughly wash the spray mixture from the outside of the spray tank and the boom. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer again, flush the tank, boom and hoses for 5 minutes with fresh water.

Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

Hazard Rating:

Caution Poison

Warning Skin and Eye Irritant

This product contains 4 percent phenol, which has been determined to be of toxicological concern.

Muster Toss-N-Go

Herbicide Group – 2
(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

75 percent ethametsulfuron-methyl formulated as a dry flowable. Container sizes - 4 water soluble bags (80 g each, total 320 g).

Crops:

Canola (rapeseed), condiment mustard (brown and oriental only).

Crop Stage:

Canola - Crop must be in the 2 leaf stage (true leaves) to the beginning of bolting. Do not apply prior to this stage as severe crop injury can occur.

Mustard - Crop must be in the 4 leaf stage but prior to bolting. Do not apply prior to this stage as severe crop injury can occur. Spraying must take place at least 60 days prior to harvest.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds Controlled and Rates:

Weeds controlled at the 8 g/acre rate (one case treats 40 acres):

Flixweed[1]
Green smartweed
Hemp-nettle
Stinkweed[2]
Wild mustard

Weeds controlled at the 12 g/acre rate (one case treats 26.7 acres):

Above weeds plus:
Stinkweed
Redroot pigweed[2]

[1] Spring seedlings only

[2] Suppression with Muster alone but control with Assure II plus Hi-Mix/Sure-Mix or a Poast Ultra + Merge tank mix

Muster applied alone requires the addition of Agral 90, Agsurf, or Citowett at 0.2 L per 100 L of spray solution. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Weed Stage:

2 to 6 leaf stage. Stinkweed must be sprayed in the 1 to 4 leaf stage.

Cost:

$15.95 to $23.90/acre (2000 suggested retail price).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi).

Equipment and Nozzles:

Flat fan nozzles. Sprayer must be equipped with continuous agitation. Use 50 mesh or coarser strainers and screens.

How it Works:

Muster is absorbed by foliage and roots, and inhibits plant growth. Symptoms, including discolouration (yellowing, reddening, purpling) of susceptible weeds are noticeable 1 to 2 weeks after application.

Effects of Growing Conditions:

Do not use on crops that are stressed because of drought or flooding. Less than acceptable control will occur in fields where high weed populations exist and where stressful environmental conditions prevail (drought, cold weather). Heavy rainfall soon after application may result in visual crop injury or possible yield reduction. Thin crop stands or application prior to the 2 leaf stage, sandy soils or soils with low organic matter may increase the severity of the injury.

Tank Mixes:

Do not mix with substances that contain boron or that release chlorine.

Herbicides: Canola - Muster may be tank mixed with Assure II, Poast Ultra or Select. No additional adjuvant is required with tank mixes.

Fertilizers: None registered. Do NOT mix soluble bags with liquid fertilizers.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 4 to 6 hours will reduce control.

Grazing: Do not graze or feed crop to livestock within 60 days of application.

Preharvest: 60 days

Recropping: Do not sow wheat, barley, oats or flax within 10 months of application. Do not sow canola, lentils, peas, fababeans, tame mustard, alfalfa, canaryseed, dry beans, fescues or red clover within 22 months of application. All other crops must not be sown until a "field bioassay" is performed at 22 months (or more) after application. Growers may experience reduced yields if other crops (such as corn) are grown without following these guidelines.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Environment: Leave a 15 m buffer between the last sprayer pass and wetland areas or waterways. Leave a 5 m buffer between the last spray pass and woodlots, shelterbelts, ditch bank vegetation and the borders of dry sloughs.

Tank Cleaning:

Sprayers used to spray Muster should be flushed out immediately after Muster is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1L of 3 % ammonia per 100 L water). All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Odyssey

Herbicide Group – 2
(Refer to page 20)

Company:

BASF

Formulation:

35 percent imazamox and 35 percent imazethapyr formulated as a dispersible granule. Container size - 4 x 173 g water soluble bags and 1 x 8.1 L jug of Merge.

Crops:

Field peas and CLEARFIELD canola varieties. Apply only to CLEARFIELD canola varieties; application to any other variety of canola will result in crop death.

Weeds Controlled and Rates:

At 12 g/acre (60 acres/case), Odyssey will control:

Redroot pigweed
Wild mustard
Volunteer tame mustard

At 17 g/acre (40 acres/case), Odyssey will control:

Barnyard grass
Chickweed
Cleavers
Flixweed
Green foxtail
Green smartweed
Hemp-nettle[1]
Kochia
Lamb's quarters[2]
Persian darnel
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Stork's-bill
Volunteer canola
  (not CLEARFIELD varieties)
Volunteer cereals
  (wheat, barley, oats)
Volunteer tame mustard
Wild buckwheat[1]
Wild mustard
Wild oats

[1] Suppression only in field peas.
[2] Suppression only in field peas and CLEARFIELD canola.

Apply with Merge at a rate of 0.5 L per 100 L spray solution. Do not apply more than once per year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Crop Stage:

Field peas - 1 to 6 above-ground nodes (1 to 6 true leaves). CLEARFIELD canola - 2 to 6 leaf stage. Temporary crop yellowing may be observed shortly after application in field peas and CLEARFIELD canola.

Weed Stage:

Grassy weeds - 1 to 4 main stem leaves, until tillers are visible.

Broadleaf weeds - cotyledon to 4 leaf stage.

Cleavers - cotyledon to 4 whorl stage.

Cost:

$18.12 to $25.67/acre (2000 suggested retail price).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan. Use 50 mesh or coarser filter screens.

How it Works:

Odyssey is a systemic herbicide that is absorbed through foliage and plant roots and is translocated to growing points in plants. Symptoms appear in 3 to 10 days and include yellow striping on the newest leaves of grassy weeds, and yellowish, purplish, or reddish discolouration of the newest leaves of broadleaf weeds. Symptoms progress to older leaves and plant death occurs in 1 to 3 weeks.

Effects of Growing Conditions:

No information provided on the product label. Plants are under stress when conditions before or after application are very hot or cold, or excessively dry or wet. During periods of stress, plants are not actively growing and reduced weed control or crop injury may result.

Tank Mixes:

Herbicides: Odyssey may be tank mixed with Lontrel (0.17 - 0.23 L/acre) in CLEARFIELD canola only.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crop or cut for feed prior to crop maturity. Field peas may be fed to livestock 30 days after application.

Preharvest: Do not apply within 60 days of harvest.

Recropping: Field peas, CLEARFIELD canola, and spring wheat (including durum) may be grown the year after application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above. Contact manufacturer for additional information on recropping intervals.

Aerial Application: Do not apply by air.

Storage: Do not freeze. Store in a cool, dry place above 5°C.

Environment: Avoid spraying in situations where drift may occur. Leave a buffer zone of at least 14 m between the outside boundary of the sprayed area and sensitive areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditchbanks, ponds, streams, and sloughs.

Hazard Rating:

Warning Eye Irritant

Pardner

Herbicide Group – 6
(Refer to page 20)

Company:

Aventis CropScience

Formulation:

280 g/L bromoxynil.

Container size - two 8 L containers per case.

Crops:

Barley
Canaryseed
Chemical fallow
Corn (field and sweet)
Fall rye
Flax (including Solin - low linolenic varieties)
Oats
Triticale
Wheat (durum, spring and winter)
Zero or minimum tillage
Established alfalfa (seed production only)
Seedling alfalfa (forage or seed production)

Seedling grasses, for seed production only:

Bromegrass
Creeping red fescue
Meadow fescue
Orchardgrass
Reed canary grass
Russian wild ryegrass
Timothy
Wheatgrass (creasted, intermediated, slender, tall)

Crop Stage:

CROP	STAGE
Barley, oats, triticale, wheat (spring and durum)	2 leaf stage to early flag
Canaryseed	3 to 5 leaf
Corn (field or sweet)	4 to 8 leaf
Corn (field or sweet) with drop pipes	Beyond 8 leaf
Established alfalfa	In spring, before the crop begins to shield weeds. Apply no more than twice in one growing season.
Fall rye	In spring only, from first growth to early flag
Flax (including Solin)	2 to 4 inches (5 to 10 cm)
Winter wheat	2 to 4 leaf stage (fall application) First growth to early flag leaf (spring application)
Seedling alfalfa	2 to 6 trifoliate leaf stage
Seedling grasses	2 to 4 leaf

Weeds Controlled and Staging:

Weeds controlled at the 1 to 4 leaf stage:

American nightshade
Bluebur
Cocklebur
Common ragweed
Cow cockle[1]
Green smartweed
Kochia[2]
Lady's-thumb
Pale smartweed
Pigweed
Stinkweed[1]
Russian thistle[2]
Wild mustard[1]

[1] Use high rate.

[2] Apply before plants are 2 inches high.

Weeds controlled at the 1 to 8 leaf stage:

Common groundsel
Lamb's-quarters
Tame buckwheat
Tartary buckwheat
Wild buckwheat

Cost:

$8.03 to $9.62/acre (2000 suggested retail price).

Rate:

0.405 to 0.485 L/acre (one 8 L container treats 20 to 16.5 acres). Canaryseed, seedling alfalfa - 0.405 L/acre (one 8 L container treats 20 acres). Use the higher rate if weeds are at the more advanced stages of the recommended treatment stages.

Water Volume:

Corn - 20 to 30 gallons/acre (90 to 135 L/acre).

Seedling grasses - 15 gallons/acre (70 L/acre).

Other crops - 10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

How it Works:

Pardner is a contact herbicide. Therefore, good coverage is essential. Plants turn brown and die in 3 to 5 days.

Effects of Growing Conditions:

Avoid spraying if temperatures are greater than 25°C. Leaf scorching may occur in corn if applied during or after adverse growing conditions, such as cool and wet or hot (greater than 27°C) and humid weather.

Tank Mixes:

Herbicide Tank Mix Table

CROP	PARDNER TANK MIXES
Spring wheat	2,4-D, Achieve, Avenge, Avenge + MCPA ester, MCPA, Horizon, Hoe-Grass 284, Sundance
Winter wheat	Achieve, MCPA, 2,4-D
Barley	2,4-D, Achieve, Avenge, Hoe-Grass 284, Avenge + MCPA ester, MCPA
Oats	MCPA amine, MCPA ester, MCPA K
Fall rye, canaryseed, seedling forage grasses	MCPA amine, MCPA ester, MCPA K
Corn (do not add oil or surfactant)	Atrazine, Banvel II (field corn only)
Pre-seeding cereals	Glyphosate
Summerfallow	Glyphosate

Fertilizers: None registered.

Insecticides: May be tank mixed with Decis.

Fungicides: May be tank mixed with Tilt.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour of application will reduce control.

Grazing: Do not graze treated wheat, barley, oats or seedling alfalfa crops or cut for feed within 30 days of application. Do not graze other treated crops or cut for hay prior to crop maturity.

Recropping: No restrictions.

Aerial Application: Registered for aerial application on wheat and barley. The use of low water volumes (2 to 4 gallons/acre - 9 to 18 L/acre) may result in less effective weed control than seen with ground application.

Storage: May be stored at freezing temperatures. Will return to original state by warming to room temperature (20 to 22°C) and agitating thoroughly.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Non-labelled broadleaf crops may be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison

Pea Pack

Herbicide Group – 4, 5
(Refer to page 20)

Company:

Bayer Inc.

Formulation:

Sencor 75DF (75 percent metribuzin formulated as a dispersible granule). Container size - 3 kg.

MCPA sodium salt (300 g/L MCPA sodium salt) formulated as a solution. Container size - 7.6 L.

Crops:

Peas.

DO NOT USE ON LENTILS OR CHICKPEAS.

Do not use on peas seeded less than 2 inches (5 cm) deep or on soils with less than 4 percent organic matter.

Weeds:

Lamb's-quarters, redroot pigweed, stinkweed, volunteer canola (including all herbicide-tolerant canolas except triazine-tolerant cultivars), wild mustard.

Crop Stage:

Apply before pea vine is 6 inches (15 cm) long.

Weed Stage:

Post-emergence applications should be made when weeds are small i.e. less than 2 inches (5 cm) in height or diameter.

Cost:

$5.95/acre (2000 suggested retail price).

Rate:

77 g Sencor DF and 189 mL MCPA sodium salt per acre. Each case will treat 40 acres.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Water Volume:

15 gallons/acre (70 L/ha)

Pressure:

200-275 kPa (30-40 psi)

Nozzles:

Flat fan nozzles with an opening no smaller than 8002 or TK2 with 50 mesh screen. Angle nozzles 45° forward.

How it Works:

Sencor is a systemic herbicide that kills weeds by stopping photosynthesis. MCPA sodium salt is a systemic herbicide that disrupts cell division. MCPA sodium salt is absorbed through leaves and roots and is translocated to actively growing areas in the plant. Control of susceptible weeds occurs within 7 to 10 days.

Effects of Growing Conditions:

Crop height reductions or yellowing may occur if high temperatures occur within 48 hours of application. Cold, cloudy weather or frost within 3 days of application may also aggravate crop injury. If frost occurs, allow 4 to 5 days for crop to recover prior to applying Sencor. Applications made under conditions of high humidity may cause pea vines to droop, but the crop will recover quickly.

Tank Mixes:

None registered.

Allow 4 to 5 days between applications of Pea Pack and the application of another pesticide.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Rainfall within 6 hours of application may reduce control.

Grazing: Do not graze treated crops within 30 days of application, or peas within 70 days of application.

Preharvest: Do not harvest peas within 70 days of application.

Recropping: There are no recropping restrictions the year following application.

Storage: Do not freeze.

Tank Cleaning:

Spray equipment must be thoroughly cleaned to remove traces of herbicide that might injure other crops to be sprayed. Drain any remaining solution from the spray tank. Rinse the spray tank and refill with water, adding a heavy-duty detergent at the rate of 0.25 L per 100 L of water. Recycle this mixture through the equipment for 5 minutes and spray out. Repeat this procedure twice. Fill the spray tank with clean water, recycle for 5 minutes, and spray out. Clean pump and nozzle screens thoroughly.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent.

Hazard Rating:

Warning Poison

Pinnacle

Herbicide Group – 2

(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

75 percent thifensulfuron methyl as a water dispersible granule. Container size – 8 x 8 g water soluble pouches

Crop:

Soybeans

Weeds Controlled:

Lady's-thumb, lamb's-quarters[1], redroot pigweed, wild mustard, velvetleaf[1].

[1] High rate of application only

Crop Stage:

First fully expanded trifoliate leaf to flower initiation.

Weed Stage:

Up to 10 cm (4 inches) tall or wide.

Cost:

$ 9.11 to $13.66/acre

Rates:

2.2 to 3.3 g/acre (one container treats 20 to 28.5 acres). Requires the addition of a non-ionic surfactant such as Agral 90, Agsurf, or Citowett at 1 L per 1000 L of spray solution.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

Minimum of 10 gallons / acre (45 L / acre)

Pressure:

275 kPa (40 psi)

Nozzles:

Flat Fan

How it Works:

Pinnacle is a systemic herbicide that is absorbed through the foliage and translocated to the growing points within plants. Growth stops soon after application of Pinnacle. After 1 to 3 weeks plants will discolour (yellowing, reddening, or purpling) starting with the newest leaves and spreading out from there eventually resulting in plant death.

Effects of Growing Conditions:

Pinnacle applied to crops that have been under stress before application may result in crop injury. Stress conditions within 3 days after application may also result in crop injury.

Weeds under stress conditions at the time of application may not be adequately controlled.

Stress conditions are severe weather conditions, frost, low fertility, drought, water-saturated soils, and disease or insect damage.

Injury symptoms can be crop discoloration (yellowing, purpling or reddening), or stunting.

Tank Mixes:

Herbicides:

Assure II at 0.2 L/acre with the addition of Sure-Mix at 0.5 L per 100 L of spray solution.

Basagran at 0.71 to 0.91 L/acre plus Assist at 0.405 to 0.81 L/acre.

Fertilizers: None.

Insecticides: None

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: If rainfall occurs soon after application control may be reduced. Several hours of dry weather are needed after application to allow uptake by the plants.

Grazing: Do not graze or cut for feed.

Pre-harvest interval: Must not be harvested within 60 days of application.

Recropping Interval: Do not plant any crop other than wheat or barley for 30 days after application.

Aerial Application: Do not apply by air.

Storage: Store in closed original container in a dry area away from food or feed.

Environment: Do not mix, load or apply within 15 m of water bodies, wetlands or sensitive plants. Do not apply to irrigated land where the drainage water is also used to irrigate cropland.

Tank Cleaning:

Pinnacle can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Pinnacle should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1 L of 3 percent ammonia per 100 L of water). All nozzles, screens and filters should be removed and clean separately during the cleaning process.

Hazard Rating:

Warning – Eye and Skin Irritant

Poast Ultra

Herbicide Group – 1
(Refer to page 20)

Company:

BASF

Formulation:

Poast Ultra - 450 g/L sethoxydim formulated as an emulsifiable concentrate.

Container size - 7.7 L jug of Poast Ultra and 2 x 8.1 L jugs of Merge.

Crops:

To a maximum rate of 0.45 L/acre:

Alfalfa
Alsike clover[1]
Canola
Chickling vetch
Cicer milkvetch[1]
Creeping red fescue (for seed only)
Dry beans (adzuki, kidney, lima, mung, white)
Dry field peas
Fababeans
Flax
Lentil
Mustard
Potatoes
Sainfoin[1]
Shelterbelts
Soybeans
Sunflower
Sweet clover[1]

To a maximum rate of 0.26 L/acre:

Alsike clover[2]
Caraway
Coriander
Dill
Cicer milkvetch[2]
Safflower
Sainfoin[2]
Solin (low linoenic flax)
Sweet clover[2]

To a maximum rate of 0.23 L/acre:

Tame buckwheat

To a maximum rate of 0.19 L/acre:

Chickpea

[1] Established stands
[2] Seedling stands

Crop Stage:

Creeping red fescue and broadleaf crops are tolerant at all growth stages. However, the preharvest interval outlined in the "Restrictions:" section must be followed to avoid unacceptable residues of sethoxydim in harvested crops. When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds Controlled and Rates:

WEED	RATE (L/ACRE)	ACRES TREATED PER 7.7 L CONTAINER
Green or yellow foxtail, barnyard grass, Persian darnel, proso millet, witchgrass and volunteer corn	0.13	60
Wild oats	0.13[1] or 0.19	60 or 40
Volunteer wheat, oats and barley	0.13[1] or 0.19	60 or 40
Quackgrass suppression	0.19	40
Quackgrass (season long control)	0.45	17
Foxtail barley suppression	0.45	17

[1] The low rate must only be used in canola, flax and peas when wild oat is from 1 to 4 leaves (prior to tillering) and under ideal growing conditions (adequate moisture, good fertility and moderate temperatures - 15 to 28°C). Do not apply under stress conditions.

Merge should be added at rates of 0.20 to 0.40 L/acre when using water volumes of 5 to 10 gallons/acre (23 to 45 L/acre). When using water volumes of 10 gallons/acre (45 L/acre) or higher, add Merge at a rate of 0.40 L/acre. When spraying quackgrass and foxtail barley, Merge should be added at 0.40 to 0.80 L/acre.

Weed Stage:

1 to 6 leaf stage of annual grasses.

1 to 4 leaf stage (best results prior to tillering) of wild oats, volunteer wheat and volunteer barley at the 0.32 L/acre rate. Optimum yield response occurs when weeds are controlled early.

Quackgrass - 1 to 3 leaf stage.

Foxtail barley - prior to tillering.

Cost:

$10.46 to $36.32/acre (2000 suggested retail prices).

Water Volume:

5 to 20 gallons/acre (23 to 90 L/acre). Use a minimum of 10 gallons/acre (45 L/acre) if crop or weed growth is dense, and when spraying quackgrass. Use 5 to 10 gallons/acre (23 to 45 L/acre) when using the 0.32 L/acre rate for wild oats, volunteer wheat and volunteer barley.

Pressure:

275 to 300 kPa (40 to 45 psi).

Nozzles:

Stainless steel 80° or 110° flat fan nozzles tilted forward at an angle of 45°.

How it Works:

Poast Ultra is a systemic and a contact herbicide. It is absorbed through treated leaves and translocated to growing points. Susceptible grassy weeds turn yellow and then brown, with plant death occurring in 7 to 21 days. In quackgrass, Poast Ultra is translocated to the rhizomes where it kills actively growing rhizome buds, as well as above-ground foliage. Dormant rhizome buds will remain unaffected by Poast Ultra and regrowth can occur from these buds. Regrowth is usually apparent 6 to 8 weeks after treatment.

Effects of Growing Conditions:

Most effective control will be achieved when grasses are actively growing. Do not apply to grasses stressed more than 20 days because of lack of moisture. Control may be reduced if temperatur[illegible] below 15°C. Retillering may occur under stress con[illegible] or if fertility is low.

Tank Mixes:

Herbicides: The following tank mixes can be applied with 0.13 to 0.18 L/acre of Poast Ultra. Include Merge at 0.3 to 0.4 L/acre with all mixes.

Flax:

Buctril M (0.405 L/acre) (including Solin - low linolenic flax)

Lontrel 360 (0.23 to 0.34 L/acre)

Lontrel 360 (0.23 to 0.34 L/acre) + MCPA Ester (0.34 to 0.45 L/acre of 500 g/L formulations)

MCPA Ester (up to 0.45 L/acre of 500 g/L formulations)
The above tank mixes may reduce grass control, especially under adverse weather conditions.

Canola:
Lontrel (0.17 to 0.19 L/acre)
Muster (8 to 12 g/acre)
Lontrel (0.17 L/acre) + Muster (8 g/acre) (Poast Ultra at 0.13 L/acre only)
Liberty Link canola only:
Poast Ultra at 1.1 L/acre + Liberty at 1.1 L/acre.

Field peas and CLEARFIELD canola:
Poast Ultra at 0.19 L/acre plus Merge at 0.16 L/acre may be tank mixed with the following herbicides:

Pursuit at 0.04 L/acre to control:
Chickweed
Cleavers
Hemp-nettle (peas only)
Redroot pigweed
(light infestations only)
Smartweed
Stinkweed
Volunteer canola
(non-CLEARFIELD varieties)
Wild buckwheat
(light infestations only)
Wild mustard.

The company does not provide guidelines for weed densities under light infestations. When in doubt, use the higher rate below or contact the manufacturer.
-Pursuit (0.085 L/acre) for all weeds on the Pursuit label.
Check label directions for mixing order and additional timing restrictions for broadleaf partners.

Allow 4 days between application of Poast Ultra and application of herbicides other than those registered for tank mixing. Allow 5 days between application of Sencor and Poast Ultra. Allow 14 days for regrowth when applied in sequence with a grass control herbicide.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour of application may reduce control.

Grazing: Do not graze the treated crop or cut for feed prior to crop maturity. Forage legumes may be cut after the specified preharvest interval.

Preharvest Interval: 30 days for forage legumes; 60 days for dry peas, flax; 65 days for lentils and chickpeas; 70 days for canola, chickling vetch and alfalfa; 80 days for potatoes, dry beans, soybeans, fababeans; 86 days for Solin - low linolenic flax; 90 days for safflower.

Recropping: Do not sow cereal or grass crops within 14 days of Poast Ultra application.

Aerial Application: May be applied by air in 2.2 to 4.4 gallons/acre (10 to 20 L/acre). Merge should be added at rates of 0.10 to 0.20 L/acre.

Storage: May be frozen.

Tank Cleaning:

When finished spraying Poast Ultra, run clean water through the tank, pump and lines. Drain. Refill sprayer with clean water and 1 L of household ammonia (3 percent) per 100 L of water. Circulate the solution through lines and nozzles. Let solution sit in the tank for several hours (preferably overnight). Scrub inside surfaces of tank, but do not enter the spray tank. Flush sprayer system with water until thoroughly clean. Remove and clean nozzles and screens.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Prestige

Herbicide Group – 4
(Refer to page 20)

Company:

Dow AgroSciences.

Formulation:

Prestige A: 180 g/L fluroxypyr. Container size – 6.4 L.

Prestige B: 50 g/L clopyralid and 280 g/L MCPA ester formulated as an emulsifiable concentrate.

Container size – 2 x 8.0 L.

Crops:

Spring wheat (not including durum) and barley.

Weeds Controlled and Staging:

Annual sow-thistle
Canada thistle[1]
Cleavers (1-4 whorls)
Common groundsel
Dandelion[2]
Flixweed[2]
Kochia
Lamb's-quarters
Perennial sow-thistle[1]
Redroot pigweed
Round leaved mallow
Russian pigweed
Scentless chamomile
Shepherd's-purse
Smartweed
Stinkweed
Stork's-bill (1-8 leaf)
Tartary buckwheat
Volunteer canola
Volunteer flax (1-12 cm)
Volunteer sunflower
Wild buckwheat (1-4 leaf)
Wild mustard

Weeds Suppressed:
Chickweed
Hemp-nettle (2-6 leaf stage)

[1] Spray when 4-6 inches (10-15 cm) high. Season long control, with some regrowth in the fall.
[2] spring rosettes only.

Unless otherwise stated, weeds should be sprayed in the 2 to 4 leaf stage.

Cleavers and chickweed should be sprayed as late as possible (within recommended stages) to ensure the majority of the weed flushes have emerged.

Crop Stage:

3 leaf to just before the flag leaf stage.

Cost:

$14.65 per acre (2000 suggested retail price).

Rates:

Prestige A: Apply at 0.32 L/acre

Prestige B: Apply at 0.8 L/acre

One case of Prestige will treat 20 acres.

Water Volume:

10 gal/acre (45 L/acre)

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan nozzles tilted forward at a 45° angle.

How it Works:

The components of Prestige move within the plant to control exposed and underground plant tissues. They mimic naturally occurring plant hormones, and control weeds by disrupting normal plant growth patterns. Injury symptoms include twisting of the stem and swollen nodes.

Effects of Growing Conditions:

The activity of the Prestige is influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought or heat stress) or if heavy infestations exist.

Tank Mixes:

Herbicides:
Spring wheat (not including durum) and barley:
Achieve 80DG - 0.1 kg/acre
Assert - 0.54 to 0.67 L/acre
Puma^{120} Super - 0.15 to 0.31 L/acre

Spring wheat (not including durum):
Horizon - 0.095 to 0.115 L/acre

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours of post-emergent application may result in reduced weed control.

Grazing: Do not permit lactating dairy animals to graze treated fields within 7 days of application. Wait 30 days to cut the crop for forage, or to cut hay that has been treated with Prestige. Withdraw meat animals from treated fields at least 3 days before slaughter.

Preharvest: Wait 60 days after application before harvesting the crop.

Recropping: Wheat, oats, barley, rye, flax, canola and mustard may be seeded the year following Prestige application. Do not seed crops other than those listed above for at least 1 year following Prestige application.

Aerial Application: Do not apply by air.

Storage: Store product in original containers in a secure, dry, heated area. If the product is frozen, bring to room temperature and agitate before use.

Tank Cleaning:

Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for 10 minutes.

Fill the tank with water and circulate for 15 minutes. Spray part of the mixture through the hoses, boom and nozzles. Drain the tank. Remove and clean the nozzles and screens separately. If the spray equipment is to be used to spray crops other than cereals, repeat the above process and thoroughly wash the spray mixture from the outside of the spray tank and the boom.

Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent.

Hazard Rating:

Danger Poison.

Warning Eye Irritant.

Caution Skin Irritant.

Prevail

Herbicide Group – 1, 4
(Refer to page 20)

Company:

Dow AgroSciences.

Formulation:

The Prevail package contains 4 containers: 1 labelled "Prevail A," 2 labelled "Prevail B" and 1 labelled "Prevail C."
"Prevail A" contains 80 percent tralkoxydim formulated as a dispersible grain. Container size - 2 kg.
"Prevail B" contains 50 g/L clopyralid plus 280 g/L MCPA ester formulated as an emulsifiable concentrate. Container size - 8 L.
"Prevail C" contains adjuvant. Container size - 4 L.

Crops and Staging:

Spring wheat (including durum) and barley at the 3 to 6 leaf stage.

Weeds Controlled:

Annual sow-thistle
Canada thistle[1]
Dandelion[3]
Flixweed[3]
Green foxtail
Kochia (suppression)
Lamb's-quarters
Persian darnel
Perennial sow thistle[1]
Redroot pigweed
Scentless chamomile
Shepherd's-purse[3]
Smartweed
Stinkweed[3]
Tartary buckwheat
Wild buckwheat
Wild mustard
Wild oats
Volunteer canola

[1] Season long control, some regrowth may occur in the fall.
[2] Top growth control only.
[3] Spring rosettes only.

Weed Stage:

Apply at the 1 to 6 leaf stage of wild oats (total leaves including tillers) with a maximum of 2 tillers. Apply at the 1 to 5 leaf stage of green foxtail (total leaves including tillers) with a maximum of 1 tiller. Apply at the 2 to 3 leaf stage of annual grasses for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

Broadleaf weeds - 1 to 4 leaf stage, except scentless chamomile and kochia which are to be treated in the 2 to 4 leaf stage.

Canada thistle - Apply after all the thistles have emerged and are 4 inches (10 cm) tall but prior to bud stage.

Cost:

$24.90 per acre (2000 suggested retail price).

Rate:

The Prevail package will treat 20 acres.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

80° or 110° flat fan nozzles. All strainer and nozzle screens must be 50 mesh or coarser.

How it Works:

Tralkoxydim is translocated quickly to growing points and young leaves of plants. Growth of green foxtail and wild oats stops almost immediately, and yellowing is visible within one week. Clopyralid and MCPA are growth regulator type herbicides which are absorbed through leaves and stems and are translocated to all parts of the plant. Symptoms include swollen growing points and roots, twisted stems and leaves, and a gradual discoloration from green to yellow to brown. Susceptible plants die in 2 to 3 weeks.

Effects of Growing Conditions:

Unacceptable crop injury (crop yellowing, stunting) can occur if Prevail is applied when temperatures of 5°C or below occur within 48 hours of application. Do not apply Prevail if the crop is under stress from extreme drought or excessive moisture conditions. Weed control could be reduced if weeds are stressed because of drought, flooding or prolonged hot or cool temperatures.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Allow a minimum 7 day interval between the application of Prevail and any other pesticide. Apply Prevail 7 days before any other herbicide.

Restrictions:

Rainfall: Within 6 hours may reduce control.

Grazing: Do not graze treated crops or cut for livestock feed. Do not feed straw treated with Prevail.

Preharvest: Do not apply within 60 days of harvest.

Recropping: Wheat, barley, oats, rye, corn, flax, canola, mustard, and forage grasses may be seeded the following year. Do not seed peas, lentils, sunflowers, beans, alfalfa, or clover crops the following year.

Aerial application: Do not apply by air.

Storage: If any component is frozen, bring to room temperature and agitate.

Tank Cleaning:

When spraying is completed, thoroughly rinse the tank with clean water to remove any residues. The addition of a detergent or Agral 90, Agsurf will enhance removal of any residues in the tank.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison
Warning Eye and Skin Irritant

Primextra II Magnum

Herbicide Group – 15, 5
(Refer to page 20)

Company:

Syngenta

Formulation:

400 g/L of s-metolachlor + 313 g/L of atrazine formulated as a liquid. Container size - 14 L.

Crops:

Corn

Weeds:

- American nightshade
- Barnyard grass
- Buckwheat
- Eastern black nightshade
- Green foxtail
- Lady's-thumb
- Prostrate pigweed
- Purslane
- Ragweed
- Redroot pigweed
- Smartweed
- Wild mustard
- Yellow foxtail
- Yellow nutsedge[1]

[1] Herbicide must be incorporated for best control.

Crop Stage:

Preplant incorporated.

Pre-emergence if irrigated within 10 days of application.

Weed Stage:

Pre-emergence.

Cost:

$21.66 to $28.89/acre (2000 suggested retail price).

Rates:

WEED POPULATIONS	RATE (L/ACRE)	ACRES TREATED PER 10 L CONTAINER
Light infestations	1.2	11.7
Medium infestations	1.4	10
Heavy infestations	1.6	8.8

Water Volume:

15 gallons/acre (70 L/acre).

Pressure:

200 to 300 kPa (30 to 45 psi).

Nozzles:

Flat fan with 50-mesh nozzle screens.

Incorporation:

Incorporate using S-tine or C-tine cultivators or tandem disk. Do not incorporate deeper than 4 inches (10 cm).

To ensure that the product remains in the top 2 inches (5 cm) of soil, apply to a firm seedbed free of large clods or lumps. If using tandem disks, set disks to work the soil at a depth of 4 inches (10 cm) and operate at a speed of 4 mph (6 km/hr). If using an S-tine cultivator, set the implement to work the soil to a depth of 4 inches (10 cm) and operate at a speed of 6 mph (10 km/hr).

How it Works:

Primextra II Magnum contains both atrazine and metolachlor. Atrazine is a systemic herbicide which is absorbed by roots and foliage. Photosynthesis is blocked. Control may not be noticeable for 7 to 10 days after treatment. Metolachlor inhibits the germination of weeds, particularly grasses.

Effects of Growing Conditions:

Extended periods of dry soil conditions may result in reduced weed control. Moderate rainfall after application will enhance activity. Heavy rainfall following application of Primextra II Magnum may dilute the metolachlor deeper than 2 inches (5 cm) and result in reduced weed control, particularly on light textured soils.

Tank Mixes:

Herbicides: None registered.

Fertilizers: May be tank mixed with liquid fertilizer for preplant incorporated applications. Conduct a compatibility test by performing a jar test prior to mixing the products in the tank. May be impregnated onto dry bulk fertilizers (except nitrate or superphosphate fertilizers).

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Moderate rainfall shortly after application will enhance activity. Heavy rainfall reduces weed control by leaching the chemical out of the top few centimetres of soil. Inadequate rainfall after application (within 10 days) will cause reduced weed control.

Grazing: Do not graze or cut corn for feed before ear emergence.

Recropping: This product contains Atrazine. All crops except corn and triazine-tolerant canola may be affected the year following the use of Atrazine. Other more sensitive crops may be affected two or more growing seasons after application.

Aerial Application: Do not apply by air.

Storage: Store in a dry place.

Environment: Do not mix or load this product within 30 m, or apply within 10 m, of any wells, lakes, streams, ponds, dugouts or sink holes.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating

Keep out of reach of children.

Princep Nine-T/Simazine 480/ Simazine 80W

See Simazine on page 208.

Prism

Herbicide Group – 2
(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

25 percent rimsulfuron formulated as a dry flowable. Container size - 480 g.

Crops:

Irrigated potatoes. Potato tolerance to Prism differs by variety. Limit first use of Prism to a small area of each variety prior to adoption as a field practice.

Weeds:

Barnyard grass
Green foxtail
Lamb's-quarters (suppression only)
Quackgrass
Redroot pigweed
Yellow foxtail

Crop Stage:

Prior to initiation of flowering.

Weed Stage:

Annual grasses - 1 to 6 leaf stage, maximum 2 tillers. Quackgrass - 3 to 6 leaf stage (less than 10 inches or 25 cm leaf extended). Redroot pigweed and lamb's quarters - 4 to 6 leaf stage (less than 4 inches or 10 cm tall or across).

Cost:

$17.50/acre (plus adjuvant cost) (2000 suggested retail price).

Rates:

24 g/acre. Add a recommended non-ionic surfactant such as Citowett Plus, Agsurf, or Agral 90 at 0.2 L per 100 L spray solution. 1 container treats 20 acres. Delay cultivation for 7 to 10 days after application. Make only one application per growing season.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

175 to 275 kPa (25 to 40 psi).

Nozzles:

Flat fan. 50 mesh screens or coarser.

How it Works:

Prism is absorbed primarily through the foliage. Plant growth stops almost immediately, but symptoms may not be visible for 1 to 2 weeks.

Effects of Growing Conditions:

Apply Prism when the temperature 24 hours before and after application is between 5°C and 28°C. Temperatures beyond this range increase the potential for crop injury. Rapid fluctuations in temperature will stress the crop (greater than a 20°C difference within 24 to 36 hours). Allow 48 to 72 hours for the crop to acclimatize before spraying Prism if severe temperature fluctuations occur. Crop injury may result if applications are made when potatoes are stressed by abnormally hot, humid, or cold weather conditions, frost, low fertility, drought, water saturated soil, compacted soil, previous pesticide applications, disease or insect damage. If potatoes have been injured by frost, wait 48 to 72 hours after normal growing conditions have resumed before applying Prism.

Warm, moist conditions after application promote good weed control with Prism while cool and/or dry conditions may reduce or delay activity. Weeds hardened off by cold weather or drought stress may not be controlled.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within 2 to 4 hours of application may reduce weed control.

Preharvest: Do not apply within 30 days of harvest.

Recropping: Spring barley, soybeans, white beans, red clover, sorghum, potatoes and field corn may be planted the year after application. Winter wheat may be planted 4 months after application. For all other crops, a field bioassay is recommended before planting.

Aerial application: Do not apply by air.

Storage: May be frozen.

Environment: Do not apply in areas where surface water from the treated area can run off to adjacent cropland, streams, irrigation water or wells. Leave a buffer of 10 m from the last spray pass and wetland areas or bodies of water. Leave a buffer of 5 m from the last spray pass and woodlots or shelterbelts.

Tank Cleaning:

Do not clean equipment near desirable trees or other plants. Do not contaminate water sources. Drain tank, hose down tank interior and flush clean water through hoses for a minimum of 5 minutes. Add water and houshold ammonia (1 L of 3 percent household ammonia per 100 L water) to spray tank. Flush hoses and nozzles, and add water to fill tank. Circulate cleaning solution for 15 minutes, and flush through boom again. Wash nozzles and screens in water/ammonia mix in pail. Repeat above tank and hose cleaning procedure. Rinse system with clean water for 5 minutes. Prior to using sprayer for next application, flush system with fresh water for 5 minutes.

Hazard Rating:

Warning Eye Irritant

Puma^{120} Super

Herbicide Group – 1
(Refer to page 20)

Company:

Aventis CropScience

Formulation:

120 g/L fenoxaprop-p-ethyl formulated as an emulsifiable concentrate. Container sizes – 6.2 L, 99.3L

Crops:

Spring wheat (including durum) and barley*

***Apply to barley only when tank mixed with a broadleaf product.**

Weeds:

Wild oat, green foxtail, barnyard grass.

Crop Stage:

Wheat: 1 to 6 leaves on the main stem plus 3 tillers.

Barley: 1 to 5 leaves on the main stem plus 2 tillers.

Treatment at the 3-4 leaf stage of crops and weeds will maximize crop tolerance and weed control. Temporary crop injury such as shortening or discolouration may be observed after application. Such injury is more likely to occur in barley and also when Puma^{120} Super is applied outside recommended stages.

Weed Stage:

Apply when annual grass weeds are in the 1 to 6 leaf stage up to emergence of 3rd tiller. Optimal staging is from 2 to 4 leaves.

Cost:

$7.75 - $15.50 per acre (2000 suggested retail price)

Rates:

WEEDS CONTROLLED	RATE	AREA TREATED PER:	
		6.2 L/CONTAINER	99.3 L/CONTAINER
Green foxtail only	0.154 L/acre	40.5	645
Low wild oat infestations	0.268 L/acre	23.1	370
Moderate-heavy wild oat infestations, barnyard grass, green foxtail	0.308 L/acre	20.1	322.5

Water Volume:

Wheat: 5-10 gal/acre (23-45 L/acre)

Barley: a minimum of 10 gal/acre (45 L/acre).

Pressure:

40 psi (275 kPa)

Nozzles:

80° or 110° flat fan nozzles tilted forward at a 45° angle. Do not use flood jet nozzles, controlled droplet application equipment or Sprafoil (Spray-air) equipment.

How it Works:

Puma^{120} Super is a systemic herbicide that is translocated from the leaves to the growing points within the plant. Symptoms include reduced growth and chlorosis (yellowing) of treated leaves within 3 to 7 days. Chlorosis progresses and plant death occurs 14 to 21 days after application.

Effects of Growing Conditions:

DO NOT apply Puma^{120} Super 2-3 days prior to, or following, temperatures of 3°C or lower as crop injury may occur.

Under stressful conditions (hot/dry, waterlogging, disease or insect damage) or heavy crop canopy, early application will improve weed control.

Tank Mixes:

Herbicides:

Spring wheat (not including durum):

Attain – 40 acres/case rate
Prestige – 20 acres/case rate

Spring and durum wheat:

2,4-D Ester LV 600 – 0.28 L/acre, LV 700 – 0.24 L/acre
Ally – 2 to 3 g/acre
Buctril M – 0.40 L/acre
Curtail M–0.80 L/acre
**DyVel – 0.50 L/acre
**DyVel DS – 0.44 L/acre
Estaprop – 0.70 L/acre
**Express Pack – 40 acres/case rate
Lontrel 360 – 0.17 L/acre
*Lontrel 360 (0.17 L/acre) + MCPA Ester*** (0.34 L/acre)
*Lontrel 360 (0.112 L/acre) + MCPA Ester*** (0.34 – 0.45 L/acre)
MCPA Ester – 0.34 L/acre
MCPA Amine – 0.34 L/acre
*Mecoprop – 2.2 to 2.8 L/acre
Refine Extra – 8 g/acre
Refine Extra (8 g/acre) + MCPA Ester*** (0.34 L/acre)
Thumper – 0.40 L/acre
Unity – 40 acres/case rate

Barley:

NOTE: Do NOT apply Puma^{120} Super alone in barley. ALWAYS tank mix with a registered broadleaf herbicide.

Ally - 2 to 3 g/acre
Buctril M – 0.4 L/acre
Curtail M – 0.6 to 0.8 L/acre
**DyVel – 0.5 L/acre
*Estaprop – 0.7 L/acre
**Express Pack – 40 acres/case rate
MCPA Amine 0.34 L/acre
MCPA Ester 0.34 L/acre
Prestige – 20 acres/case rate
Refine Extra – 8 g/acre
Refine Extra (8 g/acre) + MCPA Ester*** (0.34 L/acre)
Thumper – 0.40 L/acre
Unity – 40 acres/case rate

*use only at the high rate of Puma^{120} Super
**use only at the green foxtail rate of Puma^{120} Super
***use 500 g/L formulations only

Fertilizers: None registered

Insecticides: None registered

Note: Leave an interval of 7 days prior to application or 4 days after application of Puma^{120} Super, when applying any pesticide that is not registered as a tank mix.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour may reduce control.

Grazing: Do not graze or cut for hay, crops that have been treated with Puma^{120} Super.

Preharvest: Do not apply within 65 days of harvest.

Recropping: No restrictions in the year after application. Only one application may be made per year.

Aerial Application: Do not apply by air

Storage: Do not freeze.

Environment: Do not apply within 10m of a body of water or wetland.

Tank Cleaning:

Before and after using Puma^{120} Super, complete a thorough cleaning of the spray tank, lines, and filters. This is especially important, since the previously sprayed product may cause injury to the crop you intend to spray.

The manufacturer recommends flushing spray equipment with a water/ammonia mixture to remove Puma^{120} Super after application.

Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent.

Hazard Rating:

Caution Poison.

Eye and Skin Irritant.

Puma Super

Herbicide Group – 1
(Refer to page 20)

Company:

Aventis CropScience

Formulation:

92 g/L fenoxaprop-p-ethyl formulated as an emulsifiable concentrate. Container size – one case contains 2 x 8.1 L jugs.

Crops:

Spring wheat (including durum), and barley.*

***Apply to barley only when tank mixed with a broadleaf herbicide.**

Weeds:

Wild oat, green foxtail, barnyard grass.

Crop Stage:

Apply to wheat that has a minimum of 1 leaf to a maximum of 6 leaves on the main stem plus 3 tillers. Apply to barley at 1 leaf to a maximum of 5 leaves on the main stem plus 2 tillers. Application beyond this stage may result in crop injury.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

Apply when annual grass weeds are in the 1 to 6 leaf stage with a maximum of 3 tillers. Optimal staging is from 2 to 4 leaves.

Cost:

$7.75 to $15.50 per acre (2000 suggested retail price).

Rates:

WEEDS CONTROLLED	RATE (L/ACRE)	ACRES TREATED PER CASE
Green foxtail only	0.202	80
Light wild oat infestations, green foxtail	0.35	46
Barnyard grass, green foxtail, moderate to heavy populations of wild oat	0.405	40

Water volume:

Wheat: 5-10 gal/acre (23-45 L/acre).

Barley: 10 gal/acre (45 L/acre)

Pressure:

275 kPa (40 psi)

Nozzles:

80° or 110° flat fan nozzles tilted forward at a 45° angle. Do not use flood jet nozzles, controlled droplet application equipment or Sprafoil equipment

How it Works:

Puma Super is a systemic herbicide that is translocated from the leaves to the growing points within the plant. Symptoms include reduced growth and chlorosis (yellowing) of treated leaves within 3 to 7 days. Chlorosis progresses and plant death occurs 14 to 21 days after application.

Effects of Growing Conditions:

Crop injury and/or reduced weed control may result if applications are made while the plant is under stress. Plants can be stressed by hot, and/or dry conditions, frost, waterlogged soil, and damage from severe weather, disease or insects. Using maximum rates and optimal staging can help to reduce the effects of weather if application under these conditions is unavoidable.

Tank Mixes:

Herbicides: The following products may be tank mixed with Puma Super used at the 0.405 L/acre rate unless otherwise indicated.

Barley:
MCPA Ester (500 g/L) – 0.34 L/acre
Refine Extra – 8 g/acre*
Refine Extra (8 g/acre) + MCPA Ester (500 g/L)* (0.34 L/acre)

NOTE: DO NOT apply Puma Super alone in barley: always tank mix with a registered broadleaf partner.

Spring and Durum Wheat only:
2,4-D Ester (600 g/L) – 0.28 L/acre*
2,4-D ester (700 g/L) - 0.24 L/acre*
Ally – 2 to 3 g/acre*
Assert - 0.54 L/acre. Use 0.15 L/acre Puma Super.
Buctril M – 0.405 L/acre*
Curtail M – 0.80 L/acre
Estaprop – 0.71 L/acre*
Lontrel 360 – 0.17 L/acre*
Lontrel 360 (0.17 L/acre) + MCPA Ester (500 g/L) (0.34 L/acre)
Lontrel 360 (0.11 L/acre) + MCPA Ester (500 g/L) (0.34 to 0.45 L/acre)
MCPA Amine (500 g/L) – 0.34 L/acre*
MCPA Ester (500 g/L) – 0.34 L/acre*
Refine Extra – 8 g/acre*
Refine Extra (8 g/acre) + MCPA Ester (500 g/L) + 0.34 L/acre*
Thumper – 0.40 L/acre*

Spring Wheat (not including durum) only:
Attain – 40 acres/case rate
DyVel DS – 0.445 L/acre (only with 0.202 L/acre rate of Puma Super)
Unity – 40 acres/case rate

*May also be used with the 0.202 L/acre rate for green foxtail control only.

Fertilizers: None registered.

Insecticides: None registered.

Note: Leave an interval of 7 days prior to application or 4 days after application of Puma Super, when applying any pesticide that is not registered as a tank mix.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour may reduce control.

Grazing: Do not graze or cut for hay, crops that have been treated with Puma Super.

Recropping: No restrictions in the year after application. Only one application may be made per year.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Environment: Do not apply within 15 m of a body of water or wetland area.

Tank Cleaning:

Before and after using Puma Super, complete a thorough cleaning of the spray tank, lines, and filters. This is especially important, since the previously sprayed product may cause injury to the crop you intend to spray.

The manufacturer recommends flushing spray equipment with water/ammonia mixture to remove Puma Super after application.

Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent.

Hazard Rating:

Caution Poison
Eye and Skin Irritant.

Pursuit

Herbicide Group – 2
(Refer to page 20)

Company:

BASF

Formulation:

240 g/L imazethapyr formulated as a liquid. Container size - 3.3 L.

Crops:

Chickling vetch grown for seed.
CLEARFIELD canola varieties
Dry beans (pinto, pink and red varieties only)
Established alfalfa (for seed production only)
Field peas
Seedling alfalfa

Apply only to alfalfa stands that will be in production for 3 years following application.

Do NOT use in the brown or dark brown soil zones (except for use in alfalfa under irrigated brown soils); rotational crops may be severely injured due to carryover in these soils. Do NOT apply Pursuit to the same field two years in a row.

Weeds:

In field peas and CLEARFIELD canola varieties, weeds controlled include:

Green foxtail
Wild oats
Chickweed
Redroot pigweed
Stinkweed
Volunteer canola (not CLEARFIELD varieties)
Lamb's-quarters[3]
Cleavers
Hemp nettle[1]
Shepherd's purse[1]
Smartweed
Wild buckwheat
Wild mustard
Volunteer barley[2,3]
Volunteer wheat[2,3]

[1] In field peas only.
[2] In CLEARFIELD canola only.
[3] Suppression

In seedling and established alfalfa, weeds controlled include:

Redroot pigweed
Stinkweed
Wild mustard
Common groundsel[4] (suppression)
Shepherd's purse[4] (suppression)
Volunteer canola (not CLEARFIELD varieties)
Green smartweed[4]
Lamb's quarters[4] (suppression)
Green foxtail (suppression)

[4] In seedling alfalfa only.

In dry beans, weeds controlled include:
Hairy nightshade

Crop Stage:

Field peas - may be applied up to the sixth above-ground node stage (6 true leaves).

Seedling alfalfa - apply after the first trifoliate leaf stage.

Established alfalfa - apply before alfalfa reaches 12 inches (30 cm) in height.

CLEARFIELD canola - apply after the first leaf stage.

Dry beans - up to and including the second trifoliate leaf stage.

Chickling vetch grown for seed - apply at the 5 - 7 leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weed Stage:

Up to the 4 leaf stage. For wild oats, apply from the 2 to 4 leaf stage. Up to 6 leaf stage of hairy nightshade.

Cost:

$21.62/acre (2000 suggested retail price).

Rates:

Apply 0.085 L (85 mL)/acre. A non-ionic surfactant (Agral 90, Agsurf, Surf 92) should be added at a rate of 0.25 L per 100 L of spray solution. Do not overapply Pursuit, as crop injury may result. Only one application may be made during the growing season.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

10 to 40 gallons/acre (45 to 180 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

How it Works:

Pursuit is a systemic herbicide that is absorbed through foliage and plant roots and is translocated to growing points in plants. Symptoms appear in 3 to 10 days and include yellow striping on the newest leaves of grassy weeds, and yellowish, purplish, or reddish discolouration of the newest leaves of broadleaf weeds. Symptoms progress to older leaves and plant death occurs in 1 to 3 weeks.

Effects of Growing Conditions:

Plants are under stress when conditions before or after application are very hot or cold, excessively dry or wet. During periods of stress, plants are not actively growing and reduced weed control or crop injury may result.

Tank Mixes:

Herbicides:

In Field Peas:

Pursuit at 0.04* to 0.085 L/acre (40 to 85 mL/acre) can be tank mixed with Poast Ultra at 0.19 L/acre.

Pursuit at 0.085 L/acre (85 mL/acre) can be tank mixed with Select at 0.08 L/acre (80 mL/acre)*.

In CLEARFIELD canola:

Pursuit at 0.04* to 0.085 L/acre (40 to 85 mL/acre) can be tank mixed with;

Poast Ultra at 0.19 L/acre

Select at 0.08 L (80 mL)/acre*.

* The use of Pursuit at low rates with Select is not supported by BASF. Check the label of the grass herbicide for the list of weeds controlled when using the low rate.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze or harvest seedling alfalfa within 14 days of treatment. Do not graze other treated crops or cut for feed prior to crop maturity. Do not graze or harvest field peas for feed within 30 days.

Preharvest: Do not apply within 60 days of harvesting field peas, within 70 days of harvesting CLEARFIELD canola, or within 75 days of harvesting dry beans.

Recropping: Rotate to barley, spring wheat (not durum), lentils, alfalfa, field peas or Smart canola the year following application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year **before** growing **any** crop other than those listed above. However, yield losses within the test strips may not be noticed unless the yield can be compared to an untreated area seeded adjacent to the Pursuit-treated strip. In case of crop failure, only field peas or Smart canola may be replanted in the year of application.

Aerial application: Do not apply by air.

Storage: Do not freeze. If the product is exposed to temperatures below 0°C, thaw the product completely and shake the container vigorously prior to use.

Environment: Do not apply within 15 m of shelterbelts, waterbodies, wetlands, and woodlots.

Tank Cleaning:

Non-labelled grass and broadleaf crops can be damaged by in-tank residues. The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Keep out of reach of children.

Pursuit Ultra

Herbicide Group – 2
(Refer to page 20)

Company:

BASF

Formulation:

Poast Ultra - 450 g/L sethoxydim formulated as an emulsifiable concentrate.

Pursuit - 240g/L imazethapyr formulated as a liquid.

Merge - 2 x 8.1 L jugs

Container size - Jugs are split internally and contain both Poast Ultra and Pursuit. Each split jug treats 40 acres.

Crop:

Field peas.
CLEARFIELD canola. DO NOT use on any other canola varieties or crop death will result.

Do NOT use in the brown or dark brown soil zones as rotational crops may be severely injured due to carryover in these soils. Do NOT apply Pursuit to the same field two years in a row.

Crop Stage:

Field pea - up to the 6th above ground node stage (six true leaves).

CLEARFIELD canola - after the 1 leaf stage.

Weeds Controlled and Stages:

Grasses: at the 1 to 6 leaf stage:

Barnyard grass
Green and yellow foxtail
Quack grass[1]
Persian darnel
Proso millet
Volunteer barley
Volunteer corn
Volunteer wheat
Witchgrass
Wild oat

Broadleaf Weeds up to the 4 leaf stage:

Chickweed
Cleavers
Hemp nettle (peas only)
Redroot pigweed[2]
Smartweed
Stinkweed
Volunteer canola (non-CLEARFIELD varieties)
Wild buckwheat[2]
Wild mustard

[1] Suppression
[2] Light infestations only

Rates:

Poast Ultra - 0.19 L/acre;
Pursuit - 0.04 L/acre
(One split jug treats 40 acres).
Add Merge at 0.4 L/acre in a water volume of 10 gal/acre (45 L/acre).

Cost:

$24.35 per acre. (2000 suggested retail price.)

Water Volume:

10 gallons/acre (45 L/acre)

Pressure:

275 kPa (40 psi)

Nozzles:

Stainless Steel 80° or 110° flat fan nozzles tilted forward at a 45° angle.

How it Works:

Poast Ultra is a systemic and a contact herbicide. It is absorbed through treated leaves and translocated to growing points. Susceptible grassy weeds turn yellow and then brown, with plant death occurring in 1 to 3 weeks.

Pursuit is a systemic herbicide that is absorbed through foliage and plant roots and is translocated to growing points. Symptoms appear in 3 to 10 days and include yellowish, purplish, or reddish discolouration of the newest leaves of broadleaf weeds. Symptoms progress to older leaves and plant death occurs in 1 to 3 weeks.

Effects of Growing Conditions:

Reduced weed control may result if applied when weeds are stressed by hot, cold, dry or wet conditions. Control of grass weeds may be reduced if temperatures are below 15°C.

Tank Mixes:

Herbicides: None.

Fertilizers: None.

Insectcides: None.

Fungicides: None.

Restrictions:

Rainfall: Within one hour of applying Poast Ultra may reduce grass weed control. No rainfree period specified for Pursuit, required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated area prior to maturity.

Recropping Interval: Rotate to barley, spring wheat (not durum), lentils, alfalfa, field peas or CLEARFIELD canola the year following application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crop other than those listed above. However, yield losses within the test strips may not be noticed unless compared to the yield of an adjacent strip not treated with Pursuit. In case of crop failure, only field peas or CLEARFIELD canola may be re-planted in the year of application.

Aerial Application: Do not apply by air.

Storage: Maybe stored at freezing temperatures. Warm to room temperature and agitate before use.

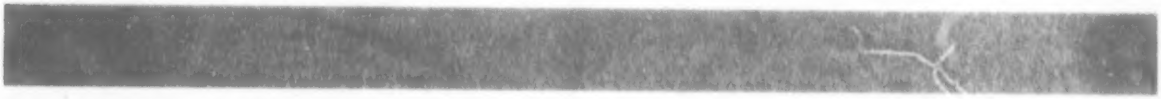
Environment: Do not apply within 15 m of shelterbelts, water bodies, wetlands and woodlots.

Tank Cleaning:

When finished spraying Pursuit Ultra, run clean water through the tank, pump and lines. Drain. Refill sprayer with clean water and 1L of household ammonia (3 per cent) per 100 L of water. Circulate the solution through lines and nozzles. Let solution sit in the tank for several hours (preferably overnight). Scrub inside surfaces of tank, but do not enter the spray tank. Flush sprayer system with water until thoroughly clean. Remove and clean nozzles and screens.

Hazard Rating:

Keep out of reach of children



Refine Extra Toss-N-Go

Herbicide Group – 2
(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

50 percent thifensulfuron methyl plus 25 percent tribenuron methyl formulated as a dry flowable. Container size - 4 water soluble bags (80 g each, total 320 g).

Crops:

Cereals:

Barley
Oats
Wheat (including durum, spring and winter)

Seedling or established forage grasses for forage or seed production:

Bromegrass (meadow, smooth)
Creeping red fescue
Kentucky bluegrass
Orchardgrass
Tall fescue
Wheatgrass (crested, intermediate, northern, pubescent, slender, streambank, tall, western)

Weeds Controlled and Staging:

Weeds Controlled:

Ball mustard
Chickweed (1 to 6 leaf)
Common groundsel
Corn spurry
Cow cockle
Flixweed
Green smartweed
Hemp-nettle
Kochia
Lady's-thumb
Lamb's-quarters
Narrow-leaf hawk's-beard
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Tartary buckwheat
Volunteer canola[1]
Volunteer sunflowers
Wild buckwheat (1 to 3 leaf)
Wild mustard

[1]Not including CLEARFIELD canola varieties.

Weeds Suppressed:

Canada thistle (less than 6 inches (15 cm) tall or across and prior to budding)
Cleavers (1 to 3 whorls)
Round-leaf mallow (2 to 6 leaf)
Scentless chamomile

Sow-thistle (less than 6 inches (15 cm) tall or across and prior to budding)
Stork's-bill (2 to 6 leaves)
Toadflax (less than 6 inches or 15 cm tall)

Unless otherwise specified, weeds should be less than 4 inches (10 cm) tall or across.

Crop Stage:

2 leaf to flag leaf.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Cost:

$5.63/acre (2000 suggested retail price).

Rate:

8 g/acre (one container treats 40 acres). Add Agral 90, Agsurf, or Citowett Plus at 0.2 L per 100 L of spray solution.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

5 - 10 gallons/acre (22 - 45 L/acre).

Pressure:

210 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan nozzles with 50 mesh line strainers and screens.

How it Works:

Refine Extra is a systemic herbicide that is absorbed through foliage and translocated to growing points within plants. Symptoms include discolouration (yellowing, purpling, reddening) of newest leaves and are visible in 1 to 3 weeks.

Effects of Growing Conditions:

Do not apply to wheat, barley or oats that are stressed by severe weather conditions (frost, drought or water saturated soil) as crop injury may result.

Under certain conditions (heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures) lightening in crop colour and reduction in crop height may occur.

Tank Mixes:

Do not mix with substances that contain boron or that release chlorine.

Herbicides: Refine Extra may be mixed with the following herbicides. Do not add a surfactant to the following mixes unless otherwise specified.

In spring wheat (including durum), barley, and oats:
MCPA amine or ester (0.28 to 0.45 L/acre, 500 g/L formulation) plus surfactant

In spring wheat (including durum) and barley:
2,4-D amine or ester (0.34 to 0.45 L/acre, 500 g/L formulation) plus surfactant
Assert (0.53 to 0.65 L/acre)
Assert (0.53 to 0.65 L/acre) + MCPA ester (0.28 to 0.45 L/acre of a 500 g/L formulation)
Puma Super (0.202 to 0.405 L/acre)
Puma Super (0.202 to 0.405 L/acre) + MCPA ester (0.34 L/acre)

In spring wheat (NOT including durum) and barley:
Curtail M (0.61 L/acre) plus surfactant
Lontrel 360 (0.085 L/acre) plus surfactant
Lontrel 360 (0.085 L/acre) + 2,4-D or MCPA ester (0.34 L/acre, 500 g/L formulation) plus surfactant

In spring wheat (including durum):
Accord (55 to 67 g/acre) plus Merge adjuvant
Accord (55 to 67 g/acre) + Avenge (1.42 L/acre) plus Merge adjuvant
Horizon (0.095 to 0.117L/acre) plus Score adjuvant
Horizon (0.095 to 0.117L/acre) + MCPA 500 ester (0.34 to 0.45 L/acre) plus Score adjuvant

Check the above tank mix partner(s) respective labels for additional staging and varietal restrictions.

Fertilizers: None registered. Do not mix soluble bags with liquid fertilizers.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 4 hours may reduce control.

Grazing: Must not be grazed or fed to livestock for 7 days after treatment.

Recropping: None the year after treatment. Canola, flax, lentils and alfalfa may be planted 2 months after an application of Refine Extra.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. May be frozen.

Tank Cleaning:

Refine Extra can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Refine Extra should be flushed out immediately after Refine Extra is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1L of 3 percent ammonia per 100 L of water). All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning - Eye and Skin Irritant

Reglone/Reglone Pro/ Reglone 240

Herbicide Group – 22
(Refer to page 20)

Company:

Syngenta

Formulation:

Reglone - 200 g/L diquat formulated as a solution with no adjuvant. Container size - 10 L.

Reglone Pro - 200 g/L diquat formulated as a solution with adjuvant in the formulation. Container size - 10 L.

Reglone 240 - 240 g/L diquat formulated as a solution with no adjuvant. Container size - 10 L.

Crops:

Dry beans, soybeans, peas, flax, solin (low linolenic acid flax), lentils, tame mustard, sunflowers, potatoes, alfalfa (for seed), bird's-foot trefoil (for seed), red and white clover (for seed) and canola (use on Argentine varieties only if crop is severely lodged). This product can cause pod drop and seed losses because of shattering in Argentine varieties of canola. Do not use on forage legumes that have been treated with a residual herbicide in the past 12 months.

Weeds:

Chemically dries down all green vegetation (including crop) present at the time of harvest.

Weed Stage:

Reglone will burn off green tissue on weed growth, regardless of stage.

Costs:

Reglone Pro - $10.77 to $30.52/acre

Reglone/Reglone 240 - $9.99 to $28.56/acre plus surfactant cost.

(2000 suggested retail prices).

Water Volumes:

Ground applications (Reglone, Reglone Pro, Reglone 240) - 20 to 50 gallons/acre (90 to 225 L/acre). Use 50 to 100 gallons/acre (225 to 455 L/acre) on potatoes.

Ground applications (Reglone Pro only) - 13 to 20 gallons/acre (60 to 90 L/acre).

Aerial applications (Reglone, Reglone Pro, Reglone 240) - minimum of 4 gallons/acre (18 L/acre).

Use the highest water volumes when crop canopy is heavy or if weed growth is dense.

Pressure:

Ground application - 200 to 275 kPa (30 to 40 psi).

How it Works:

Reglone is mainly a contact herbicide that is absorbed by the foliage of treated plants. Wilting and plant desiccation begins within several hours of application with plant death occurring in 1 to 3 days.

Effects of Growing Conditions:

Best results under cloudy conditions or in evening.

Shattering losses can increase if heavy winds, rain or hail occur after the crop has dried down.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: Fungicides may be added when applying Reglone to potatoes for vine killing.

Restrictions:

Rainfall: Within 15 minutes may reduce effectiveness.

Grazing: Crop residues remaining after harvest may be fed to livestock.

Aerial Application: May be applied by air in a minimum of 4 gallons/acre (18 L/acre) water volume.

Recropping: No restrictions the year after application.

Storage: Do not freeze.

Environment: Do not apply by air where wetlands or other good wildlife cover are present. Leave a 15 m border around the edges of sloughs and other wildlife cover.

Crop Stage:

CROP	STAGE
Dry beans, soybeans	Crop has lost 80 to 90 percent of leaves and 80 percent of pods are yellow
Flax, Solin (low linolenic varieties)	75 percent of bolls brown
Lentils	Lowest pods are light brown and rattle when shaken
Mustard	75 percent of seed has turned brown
Canola	60 to 75 percent of seed has turned brown
Sunflowers	Backs of sunflower heads and bracts are turning yellow and seed moisture is 20 to 50 percent
Potatoes	Two weeks prior to harvest
Alfalfa (for seed), bird's-foot trefoil (for seed), red and white clover	Pods are ripe but before shattering. Harvest within 7 days.
Peas	Bottom pods are ripe and dry with seeds detached from pods.

Rates:

Add 0.1 L of Agral 90 or Agsurf per 100 L of spray solution for all Reglone and Reglone 240 applications except those noted below. Reglone Pro does not require the addition of an adjuvant.

CROP	RATE (L/ACRE) Reglone, Reglone Pro		RATE (L/ACRE) Reglone 240	
	Ground	Aerial	Ground	Aerial
Dry beans, soybeans, canola, flax, solin lentils, mustard, peas, sunflowers (average crop, few weeds)	0.6	0.8	0.5	0.7
Above crops (dense crop, heavy weed infestations)	0.8	1.1	0.7	0.9
Potatoes (light stands, few weeds)	0.8 to 1.1*	2 applications required. First application – 0.8 to 1.1 L/acre. Second application (4 to 5 days later)- 0.6 L/acre	0.7 to 0.9*	2 applications required. First application – 0.7 to 0.9 L/acre. Second application (4 to 5 days later)- 0.5 L/acre
Potatoes (dense crop, heavy weed infestations) use high rate for dense or immature vines	1.7*		1.4*	
Alfalfa, bird's-foot trefoil, red and white clover (use high rates for dense crops, heavy weed infestations)	0.8 to 1.3	Not registered	0.7 to 1.1	0.7 to 1.1

*Adjuvant not required for ground applications in potatoes at these application rates. Refer to the label for more information.

Tank Cleaning:

When finished spraying Reglone, rinse the sprayer out with clean water. Run through pump, lines and nozzles. Drain tank by spraying out on an untreated portion of a crop on which the product is registered, or by spraying on uncropped land. Refill sprayer with water and Agral 90, Agsurf at 0.6 L per 1,000 L spray solution. Run the solution through lines and boom. Spray out, then refill with clean water. Leave equipment standing overnight, then drain water out.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members are likely to frequent or walk.

Hazard Rating:

Warning Poison
Danger Eye Irritant
Warning Skin Irritant

Reglone A/Reward

Herbicide Group – 22
(Refer to page 20)

Company:

Syngenta

Formulation:

Reglone A - 200 g/L diquat formulated as a solution.
Reward - 240 g/L diquat formulated as a solution.
Container sizes - 1 L and 5 L jugs.

Use:

Control of water weeds such as coontail, duckweed, Canada water weed, pond weeds, and water milfoil in farm dugouts. Offers temporary control of certain species of algae.

Cost:

Reglone A - $29.00/L
Reward - $34.80/L
(2000 suggested retail prices).

Timing:

Mid-May through late June.

Rates:

Dugouts less than 5 feet (1.5 m): Apply Reward at 7.4 L/acre OR Reglone A at 8.9 L/acre. At this rate, 2.2 L of Reward OR 2.6 L of Reglone A will treat a dugout that is 160 feet by 80 feet (49 m x 24.4 m).

Dugouts more than 5 feet (1.5 m): Apply Reward 10 to 11.8 L/acre OR Reglone A at 12.1 to 14.2 L/acre. At these rates, a dugout that is 160 feet by 80 feet (49 m x 24.4 m) will require 3.0 to 3.5 L of Reward OR 3.6 to 4.2 L of Reglone A.

Application:

Dilute 1 part Reglone A/Reward with 4 parts clean water. Spray over the water surface.

How it Works:

Reglone/Reward is mainly a contact herbicide that is absorbed by the foliage of treated plants. Wilting and plant desiccation begins within several hours of application with plant death occurring in 1 to 3 days.

Restrictions:

Environment: If weed growth is dense, protect fish by not treating more than one-fourth of dugout at a time.

Grazing: Do not use water for animal consumption for 24 hours after application.

Irrigation: Do not use water for irrigation for 5 days after application.

Domestic Use: Do not use water for human consumption for 24 hours after application.

Storage: Do not freeze.

Equipment Clean Out:

Use a detergent or wetting agent (Agral 90, Agsurf) at 60 mL per 100 L of water to flush equipment. Then rinse with clean water, leave clean water standing overnight.

Hazard Rating:

Warning Poison
Danger Eye Irritant
Warning Skin Irritant

Remedy

Herbicide Group – 4
(Refer to page 20)

Company:

Dow AgroSciences

Formulation:

480 g/L of triclopyr acid formulated as an emulsifiable concentrate. Container size - 2 X 10 L jugs

Crop:

Pastures and Rangeland

Weeds Controlled:

Woody plants controlled:

Alder
Ash
Aspen
Basswood
Beech
Birch
Blackberry
Buckthorn
Cherry*
Chokecherry*
Cottonwood
Dogwood
Elderberry
Elm*
Hawthorn
Maples
Oaks*
Poison oak
Pines*
Poplar
Red maple*
Raspberry*
Sumac
Tamarack
Wild rose
Willow

*These species may require treatment at the higher rate and may need to be retreated the following year, particularly if the original treatment was made at the lower rate.

Non-woody annual and perennial broadleaved weeds controlled are:

Burdock
Chicory
Curled dock
Dandelion
Field bindweed
Lamb's-quarters
Ragweed
Smartweed spp.
Smooth bedstraw
Vetch
Wild lettuce

Weed Stage:

For best results, apply when leaves are fully expanded and plants are actively growing until first signs of autumn coloration.

Single stem applications should not be used on woody species greater than 8 ft. (2.5 m) tall.

Cost:

$29.25 per L (2000 suggested retail price).

Rate:

Broadcast foliar - Woody species: 1.6 to 3.2 L/acre, Non-woody species: 0.4 to 1.62 L/acre

Single stem: mix 4-8 litres of Remedy in enough water to make 1000 litres of spray solution

Backpack (low volume foliar): 1-5 litres of Remedy in enough water to make 100 litres of spray solution.

Water Volume:

Broadcast foliar: minimum 200 L/ha. Proper coverage is important for effective control. Even, uniform coverage, without gaps or pooling of droplets is preferred.

Single stem: apply to the point of runoff.

Backpack (low volume foliar): thoroughly wet foliage but not to runoff

Larger Woody Species

For control of woody species larger than 8 ft. (2.5 m) the basal bark method of control is used where small amounts of Remedy mixed in oil carrier (diesel, fuel oil, kerosene, mineral oil or vegetable oil) is applied directly to the bark of the trunk. Several methods can be used. See the label for directions on this use.

Pressure:

Broadcast foliar: maximum 275 kPa (40 psi).

How it Works:

Remedy is a systemic growth regulator type herbicide that is absorbed through the leaves and stems of susceptible plants. Remedy interferes with cell division and elongation, causing leaf cupping, stem distortion and eventual death.

Effects of Growing Conditions:

Avoid spraying if temperatures exceed 28°C.

Tank Mixes:

None registered.

Restrictions:

Rainfall: No rainfree period is specified on the label; required interval may be up to 8 hours. Contact the manufacturer for more information.

Grazing:

For lactating dairy animals:

Rates below 1.9 L/acre - treated areas may be grazed or harvested for greenfeed 14 days after treatment.

Label rates greater than 1.9 L/acre - restrict grazing or greenfeed for 60 days following treatment. Do not harvest treated area for hay for 60 days after treatment.

For other livestock:

Rates below 1.9 L/acre - There is no restriction on grazing or harvesting treated areas for greenfeed but do not harvest treated areas for hay for 7 days after treatment.

Label rates greater than 1.9 L/acre - restrict grazing and harvest for greenfeed or hay for 14 days following treatment.

If less than 25% of grazed area is treated, there is no grazing restriction for other livestock.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Environment: This product is highly toxic to fish, aquatic crustaceans, and plants. Do not apply to water. Do not spray at the edge of wetlands, lakes, ponds, streams, rivers, and wetland wildlife habitats.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Pulse crops and broadleaf crops may be severely injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches near cropland or shelterbelts.

Hazard Rating:

Caution Poison.

Roundup FastForward

Herbicide Group – 9, 10
(Refer to page 20)

Company:

Monsanto Canada Inc.

Formulation:

300 g/L glyphosate acid equivalent, present as the isopropylamine salt.
16 g/L glufosinate ammonium.

Container size - 10L, 115L, 750L.

Crops:

Wheat, canola, flax (not including Solin or low linolenic varieties), peas, lentils, dry beans. Do not apply to crops grown for seed production.

Weeds:

Quackgrass, Canada thistle, general crop and weed drydown.

Crop Stage:

Apply 1.2 L/acre when crop seed moisture is 30 per cent or less. This stage typically occurs 7 to 14 days before harvest (refer to the table for visual indicators).

Timing Guidelines for Application:

CROP(S)	VISUAL SYMPTOMS INDICATING LESS THAN 30% GRAIN MOISTURE
Wheat	Hard dough stage; a thumbnail impression remains on seed.
Canola	Pods are green to yellow; most seeds are yellow to brown.
Flax (not including low linolenic acid varieties)	Majority (75% - 80%) of bolls are brown.
Peas	Majority (75% - 80%) of pods are brown.
Lentils	Lowermost pods (bottom 15%) are brown and seeds rattle.
Dry Beans	Stems are green to brown in color; pods are mature (yellow to brown in color); 80 - 90% leaf drop (original leaves).

Weed Stage:

For best results quackgrass should be actively growing and have at least 4 to 5 green leaves. Canada thistle should be actively growing and at or beyond the bud stage.

Cost:

$8.99/L (2000 suggested retail price).

Rates:

1.2 L/acre.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

How it Works:

Roundup Fast Forward contains a non-selective, systemic herbicide which moves from treated foliage into roots, killing the entire plant. It also contains a contact herbicide that is absorbed through foliage which causes yellowing and wilting 2 to 5 days after application which advance to complete browning of the above ground growth and deterioration of underground plant parts.

Effects of Growing Conditions:

Extremely cool, wet and/or cloudy weather at treatment time may slow product activity, delaying visible symptoms and crop drydown and harvest date. Do not treat plants affected by drought or disease or insect damage. Reduced results may also occur when treating weeds heavily covered with dust.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Do not apply if rainfall is forecast for the time of application as results may be reduced.

Grazing: No restrictions.

Recropping: No restrictions.

Aerial application: Do not apply by air.

Storage: May be frozen.

Environment: Do not apply within 15m of non-target areas including water bodies, wetlands (e.g. sloughs), shelterbelts, woodlots and other cover at field edges frequented by wildlife.

Equipment: Do not mix, store or apply this product in galvanized or unlined steel (except stainless steel) containers or spray tanks.

Tank Cleaning:

Flush equipment with water immediately after use.

Do not clean equipment upslope of water bodies, ditches, cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent.

Hazard Rating:

Caution Skin and Eye Irritant.

Roundup Transorb/Roundup Original/Roundup Dry/Roundup Renew

See Glyphosate sections on pages 123-135

Rustler

Herbicide Group – 4, 9
(Refer to page 20)

Company:

Monsanto Canada Inc.

Formulation:

132 g/L glyphosate present as the isopropylamine salt.

60 g/L dicamba present as a solution.

Container sizes - 10 L, 115 L.

Crops:

Summerfallow.

Preseeding in spring on fields to be sown to wheat, barley, oats and rye. May also be applied prior to sowing field corn in fields with more than 2.5 percent organic matter (do not use on sandy or sandy loam soils). Broadleaf crops such as lentils, peas, canola and flax will be injured by preseeding applications and should not be planted in fields receiving this treatment.

Weeds:

Downy brome
Volunteer cereals
Persian darnel
Green foxtail
Wild oats
Wild buckwheat
Volunteer canola[1]
Cow cockle
Flixweed
Kochia
Lady's-thumb
Lamb's-quarters
Wild mustard
Redroot pigweed
Smartweed
Stinkweed
Russian thistle
Foxtail barley (suppression only)

[1] NOT including Roundup Ready varieties.

Crop Stage:

Apply during fallow year or prior to sowing crops noted above.

Rates and Weed Stages:

Application should be made to emerged, actively growing weeds. Application at early growth stages generally provides the best results.

Annual grasses - Apply 1 L/acre between emergence and heading. For wild oat control apply at the 1 to 3 leaf stage.

Annual broadleaves - Apply 1 L/acre up to 6 inches (15 cm) height. For wild buckwheat control, apply at the 1 to 4 leaf stage.

Foxtail barley - Apply 1.26 L/acre for suppression of foxtail barley before initiation of the seed head.

Cost:

$5.99 to $7.55/acre (2000 suggested retail price).

Water Volume:

Apply 5 to 10 gallons/acre (25 to 45 L/acre) water. Use of the lower water volume will improve control. Avoid the use of extremely hard water (greater than 700 ppm calcium or magnesium or high levels of iron).

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan.

How it Works:

Rustler is a systemic herbicide which enters the plant through treated foliage. The herbicide moves to all growing points in shoots and roots, killing the plant. Visible symptoms appear in 5-7 days. Affected plants turn yellow, wilt and eventually turn brown. Complete control can take as long as 21 days.

Effects of Growing Conditions:

Reduced results may occur if application is made to weeds that are drought-stressed, damaged by disease or insects. Poor control under cool, cloudy weather can occur. Dust on foliage can also cause reduction in control.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within 6 hours may reduce weed control. Heavy rainfall within 2 hours of application may require a repeat treatment.

Grazing: Do not graze treated areas or cut for feed.

Recropping: None.

Aerial Application: Do not apply by air.

Storage: Store above 5°C.

Equipment: Do not mix, store or apply this product or spray solutions of this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

Tank Cleaning:

Clean sprayer thoroughly after application.

Flush tank with clean water and thoroughly rinse entire sprayer system. Fill tank with water and ammonia, using 1 L of household ammonia (3 percent) per 100 L of water. Pump enough solution through system to fill all parts. Fill tank, close and leave for 24 hours before draining and rinsing thoroughly with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

May cause irreversible eye damage.

Select

Herbicide Group – 1

(Refer to page 20)

Company:

Aventis CropScience

Formulation:

240 g/L of clethodim formulated as an emulsifiable concentrate. Container size - 3 L.

Crops:

Alfalfa (seedling only)
Chickpeas
Dry beans (black, great northern, pinto)
Canola
Field peas
Flax (including Solin - low linolenic varieties)
Lentils
Mustard (brown, oriental, yellow)
Potatoes
Soybeans
Sunflowers

Weeds and Staging:

Apply to the following weeds at the 2 to 6 leaf stage. For best results, apply at the 2 to 3 leaf stage.

Barnyard grass
Green foxtail
Persian darnel
Proso millet
Volunteer barley
Volunteer wheat
Volunteer oat
Volunteer corn
Volunteer canary seed
Wild oat
Yellow foxtail

Quackgrass - apply at the 2 to 6 leaf stage when 3 to 6 inches (6 to 15 cm) tall. For best results, apply at the 3 to 5 leaf stage.

Crop Stage:

Crops are tolerant at all growth stages. Apply to chickpeas before crop reaches the 9 node stage (7 inches or 18 cm maximum height).

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Cost:

$10.50 to $31.50/acre (2000 suggested retail price).

Rates and Weed Staging:

WEED	STAGE	RATE (L/ACRE)	AMIGO ADJUVANT (L PER 100 L SPRAY SOLUTION)	ACRES TREATED PER 3 L CONTAINER
Annual grasses (light[1] infestations only)	2 to 4 leaf	0.05[2]	0.5	60
Annual grasses Quackgrass (suppression only)	2 to 6 leaf	0.08	0.5	40
Quackgrass (season long control)	2 to 6 leaf	0.15	1.0	20

[1] The company does not provide guidelines for weed densities under light infestations. When in doubt as to the level of weed infestation, use the higher rate or contact the manufacturer.

[2] At this rate, Select should not be tank mixed with any other pesticide and should only be applied under the following growing conditions: good crop stand, within the recommended leaf staging (2 to 3 leaf is optimum timing) prior to tillering, light weed infestations, adequate moisture and fertility, absence of stress, and good growing conditions.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

5 to 10 gallons/acre (25 to 45 L/acre). Use 10 gallons/acre (45 L/acre) under dense weed infestations or dense crop canopies.

Pressure:

275 kPa (40 psi).

Nozzles:

Stainless steel 80° flat fan nozzles tilted forward at a 45° angle.

How it Works:

Select is a systemic herbicide that is translocated from treated foliage to growing points of leaves, roots and stems. Affected plants turn color from green to yellow to purple and finally brown. Control takes 7 to 21 days.

Effects of Growing Conditions:

Select will be less effective when plants are stressed by lack of moisture, excessive moisture, low temperature and/or very low relative humidity. Regrowth of tillers may occur if application is made under any of the above stress conditions.

Tank Mixes:

Herbicides:

Flax (not including Solin) - Select may be tank mixed at 0.08 to 0.15 L/acre with Buctril M or MCPA ester.

Select may be tank mixed at 0.08 L/acre with Lontrel at 0.23 to 0.34 L/acre. Add the recommended amount of Amigo with all tank mixes.

Solin (low linolenic flax varieties) - Select may be tank mixed at 0.08 L/acre with Buctril M.

Canola - Select may be tank mixed at 0.08 L/acre with:

Lontrel at 0.17 to 0.34 L/acre.

Muster at 8 to 12 g/acre (redroot pigweed is controlled at the 8 g/acre rate of Muster in this tank mix).

Select at 0.0255 L (25.5 mL) may be tank mixed with Liberty at 1.1 to 1.35 L/acre for use in Liberty Link varieties ONLY for enhanced control of wild oat and volunteer cereals.

Select at 0.08 L/acre may be tank mixed with Pursuit at 0.04 -0.085 L/acre.

At the low rate of Pursuit, the following weeds are controlled: chickweed, hemp-nettle, redroot pigweed* stinkweed, volunteer canola (NOT CLEARFIELD varieties) wild buckwheat*, wild mustard, plus weeds listed on Select label.

*Light infestations only. For heavy infestations, use high rate of Pursuit. Add the recommended amount of Amigo with all tank mixes.

Field peas - Select may be tank mixed at 0.08 L/acre with 0.085 L/acre Pursuit. Add the recommended amount of Amigo.

Allow 4 days between application of Select and any other chemical not recommended as a tank mix combination on the label.

Fertilizer: None registered.

Insecticide: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour may reduce control.

Grazing: Do not graze or cut treated crops for forage until 60 days after application of Select to annual crops, and 30 days after application to seedling alfalfa.

Preharvest: Do not apply within 60 days of harvesting canola, flax, solin, lentils, potatoes, chickpeas (Desi and Kabuli) or mustard (brown, yellow, oriental). Do not apply within 75 days of harvesting soybeans or field peas. Do not apply within 30 days of harvesting seedling alfalfa. Do not apply within 72 days of harvesting sunflowers.

Aerial Application: Do not apply by air.

Storage: May be stored at any temperature.

Other: Do not apply more than 0.15 L/acre to the same land area per season.

Tank Cleaning:

When finished spraying Select, thoroughly clean the sprayer by flushing the system with clean water containing detergent.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Skin and Eye Irritant

Sencor

Herbicide Group – 5

(Refer to page 20)

Company:

Bayer Inc.

Formulations:

Sencor Solupak 75 DF - 75 percent metribuzin formulated as a dispersable granule. Container size - 2.5 kg (5 water soluble bags, 500 g each).

Sencor 500F - 50 percent metribuzin formulated as a flowable. Container size - 5 L.

Sencor 75 DF - 75 percent metribuzin formulated as a dispersible granule. Container size - 2.5 and 5 kg.

Crops:

Barley, spring wheat (including durum), winter wheat (Norstar only), fababeans, lentils, peas, chickpeas, soybeans (KG20 and McCall only), potatoes (except varieties Belleisle, Shepody and Tobique and red-skinned or early maturing varieties).

DO NOT use on lentils, peas or chickpeas seeded less than 2 inches (5 cm) deep or in soils with less than 4 percent organic matter.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds Controlled:

Spring wheat (including durum) and barley:

Ball mustard[1]
Chickweed
Common groundsel[1]
Corn spurry[1]
Green smartweed
Hemp-nettle[1]
Henbit[1]
Lady's-thumb
Lamb's-quarters
Night flowering catchfly[1]
Redroot pigweed
Russian thistle
Stinkweed
Tartary buckwheat
Volunteer canola
Wild mustard
Wormseed mustard[1]

Winter Wheat:

Downy brome
Flixweed
Shepherd's-purse
Stinkweed

Field peas, lentils[2] and chickpeas[2]:

Ball mustard
Chickweed
Corn spurry
Green smartweed
Hemp-nettle
Lamb's quarters
Stinkweed
Tartary buckwheat
Volunteer canola
Wild mustard

Potatoes:

As for field peas plus:
lady's-thumb
shepherd's-purse
redroot pigweed.

Fababeans (must be applied PPI with either Edge or Treflan EC):

Ball mustard
Chickweed
Corn spurry
Green smartweed
Hemp-nettle
Lamb's quarters
Stinkweed
Tartary buckwheat
Volunteer canola
Wild mustard

plus weeds controlled by either Edge or Treflan EC.

Soybeans (must be applied PPI with Treflan EC):

Ball mustard
Chickweed
Corn spurry
Green smartweed
Hemp-nettle
Lamb's quarters
Stinkweed
Tartary buckwheat
Volunteer canola
Wild mustard

plus weeds controlled by Treflan EC.

[1] Use the high rate for best control.

[2] Suppressed only in lentils and chickpeas.

Weed Stage:

Pre-emergence.

Postemergence applications should be made when weeds are small - 2 inches (5 cm) in height or diameter.

Split applications (postemergence on lentils and peas) - 1st application at cotyledon to 2 leaf stage of weeds. 2nd application (if necessary) 7 to 10 days after the first.

Cost:

Sencor Solupac 75 DF - $64.90/kg
Sencor 500F - $43.06/L
Sencor 75 DF - $63.30/kg (2000 suggested retail price).

Water Volume:

Preplant incorporated - 10 gallons/acre (45 L/acre).

Postemergence applications - Cereals - 10 gallons/acre (45 L/acre). Lentils, peas, chickpeas - 15 gallons/acre (70 L/acre).

Pressure:

200 - 275 kPa (30 to 40 psi).

Nozzles:

Flat fan nozzles with opening no smaller than 8002 or TK2 with 50 mesh screens. For lentils, peas and chickpeas use nozzles no smaller than 8003 or TK3. Angle nozzles 45° forward.

Incorporation: All plant growth and stubble should be thoroughly worked into the soil before treatment. Apply directly to the soil surface. Two incorporations are required at right angles for thorough mixing. The first incorporation must be made within 24 hours of spraying. For fall applications, it is preferred that both incorporations be done in the fall. The second incorporation may be delayed until spring to conserve trash; however, both incorporations must be done at the recommended depth.

Incorporate with a tandem disk, disker or field cultivator (Vibrashank type). Set equipment to work at a depth of 3 to 4 inches (8 to 10 cm). Operate disc implements at 4 to 6 mph (7 to 10 km/hr), cultivators at 6 to 8 mph (10 to 13 km/hr).

Crop Stage:

CROP	APPLICATION TIMING
Barley, spring	2 to 5 leaf stage. wheat
Winter wheat	In late fall after tillers have developed (past the 3 leaf stage).
Peas	Preplant incorporated (when tank mixed with Edge DC, Rival or Treflan EC) or postemergence - up to 6 inches (15 cm) of vine length. For short-statured, determinate flowering peas, apply at the early stages within this range.
Lentils	Up to 6 inches (15 cm) of vine length. For maximum crop tolerance, apply at the 1 to 4 above ground node stage.
Chickpeas	Up to 2.5 inches (6 cm) in height, when vines have 1 - 3 above ground nodes. Note application past recommended growth stage may result in severe crop injury.
Potatoes	Preplant incorporated (with Eptam) or early postemergence (up to 4 inches or 10 cm in height).
Soybeans	Preplant incorporated (tank mixed with Treflan EC).
Fababeans	Preplant incorporated (tank mixed with Treflan EC or Edge DC).

How it Works:

Sencor is a systemic herbicide which kills weeds by stopping photosynthesis. Control may not be noticeable for 7 to 10 days after treatment.

Effects of Growing Conditions

Crop height reductions or yellowing may occur if high temperatures occur within 48 hours of application. Cold, cloudy weather or frost within 3 days of application will also aggravate injury. If frost occurs, allow 4 to 5 days for crop to recover prior to applying Sencor. Heavy rainfall soon after application to peas, lentils and chickpeas can result in stand reduction on soils with less than 4 percent organic matter.

Rates:

CROP	APPLICATION	RATES (kg or L/acre)
Barley	Postemergence	Sencor 500F - 0.111 to 0.223 Sencor 75DF - 0.08 to 0.152
Wheat	Postemergence	Sencor 500F - 0.111 to 0.172 Sencor 75DF - 0.08 to 0.111
Winter wheat	In fall - postemergence	Sencor 500F - 0.344 to 0.45
Peas	Postemergence	Sencor 500F - 0.172 to 0.223 Sencor 75DF - 0.111 to 0.152
	Split applications[1] (Do not use on processing peas)	First application of: Sencor 500F - 0.08 to 0.11 Sencor 75DF - 0.06 to 0.08 Second application 7 to 10 days later with rates within these ranges.
	Preplant incorporated (apply tank mixed with Treflan EC, Rival or Edge DC) (Do not use on processing peas)	Sencor 500F - 0.223 to 0.283 (spring) Sencor 500F - 0.280 to 0.343 (fall) Sencor 75DF - 0.152 to 0.192 (spring) Sencor 75DF - 0.190 to 0.223 (fall)
Fababeans	Preplant incorporated (apply tank mixed with Treflan EC or Edge DC)	Sencor 500F - 0.172 to 0.343 (spring) Sencor 500F - 0.280 to 0.343 (fall) Sencor 75DF - 0.111 to 0.223 (spring) Sencor 75DF - 0.190 to 0.223 (fall)
Lentils	Postemergence	Sencor 500F - 0.172 Sencor 75DF - 0.111
	Split applications[1]	First application of: Sencor 500F - 0.08 to 0.11 Sencor 75DF - 0.06 to 0.08 Second application 7 to 10 days later with rates within these ranges.
Chickpeas	Postemergence	Sencor 500F - 0.167 Sencor 75 DF - 0.111
Potatoes	Postemergence	Sencor 500F - 0.222 Sencor 75DF - 0.151
	Preplant incorporated (apply only when tank mixed with Eptam 8-E)	Sencor 500F - 0.222 to 0.343 Sencor 75DF - 0.152 to 0.223
	Pre-emergence in sprinkler irrigation systems (apply only in a tank mix with Eptam 8-E)	Sencor 500F - 0.222 to 0.343 Sencor 75DF - 0.152 to 0.223
Soybeans	Preplant incorporated (apply only when tank mixed with Treflan EC)	Sencor 500F - 0.172 to 0.343 Sencor 75DF - 0.111 to 0.223

[1] Under certain field or weather conditions a split application may provide better weed control than a single application. The first application should be made at the cotyledon to 2 leaf stage of the weeds. The second application should be made when a second flush of weeds have emerged or if weeds which were more advanced at the time of the first application have started to show regrowth. The split applications are normally 7 to 10 days apart.

Note: When Sencor is tank mixed with Edge or Treflan in peas, fababeans, and soybeans, refer to product label for maximum rates that can be applied on light textured soils.

Tank Mixes:

Herbicides: In spring wheat or barley, may be tank mixed with Banvel II, Target, MCPA amine or 2,4-D amine. In potatoes (preplant incorporated) must be applied as a tank mix with Eptam 8-E. In fababeans, must be applied as a tank mix with Edge DC or Treflan EC. In soybeans, Sencor must be applied as a tank mix with Treflan EC. In peas, Sencor may be tank mixed with Treflan, Edge or Rival. In peas, 0.113 L/acre Sencor 500F or 0.077 kg/acre Sencor 75 DF may be tank mixed with 0.19 L/acre MCPA sodium salt (300 g/L).

Fertilizers: None registered.

Insecticides: None registered.

Allow 5 days between application of Sencor and application of other pesticides.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours may reduce control.

Grazing: Do not graze treated cereal crops within 30 days of application, or peas and lentils within 70 days of application.

Preharvest: Do not harvest barley, wheat or potatoes within 60 days of application. Do not harvest lentils, chickpeas, or field peas within 70 days of application. Do not harvest processing peas within 40 days of application.

Recropping: Preplant incorporated treatments may leave a residue in the soil that will affect succeeding crops when using higher rates of product. Do not seed canola, sunflowers, onions, celery, peppers, cole crops, lettuce, spinach, red beets, turnips, pumpkin, squash, cucumbers or melons the year after treatment. Fall seeded crops may be injured when seeded the same year as preplant or postemergence applications of these products.

Aerial Application: No restrictions on label. Reduced weed control and increased crop injury can occur with aerial applications.

Storage: May be frozen.

Tank Cleaning:

Spray equipment must be thoroughly cleaned to remove traces of herbicide that might injure other crops to be sprayed. Drain any remaining spray solution from the spray tank. Rinse the spray tank and refill with water, adding a heavy-duty detergent at the rate of 0.25 L per 100 L of water. Recycle this mixture through the equipment for 5 minutes and spray out. Repeat this procedure twice. Fill the spray tank with clean water, recycle for 5 minutes, and spray out. Clean pump and nozzle screens thoroughly. Wash away any spray mixture from the outside of the spray tank, nozzles or spray rig.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Keep out of reach of children.

Simazine

Herbicide Group – 5
(Refer to page 20)

Company:

Syngenta (Princep Nine-T)

United Agri Products (Simazine 480, Simazine 80W)

Formulations:

Princep Nine-T - 90 percent simazine formulated as a water dispersible granular. Container size - 5 kg.

Simazine 80W - 80 percent simazine formulated as a wettable powder. Container size - 4 kg.

Simazine 480 - 474 g/L simazine formulated as an emulsifiable concentrate. Container size - 9.46 L.

Crops:

Established alfalfa (Princep Nine-T).

Established bird's-foot trefoil (Princep Nine-T, Simazine 80W)

Established shelterbelts (elm, caragana, green ash, Manitoba maple).

Weeds:

Barnyard grass
Lamb's-quarters
Lady's-thumb
Perennial species
  starting from seed
Purslane
Ragweed
Smartweed
Volunteer clovers
Wild Buckwheat
Wild oats
Yellow foxtail

Crop Stage:

Established forage crops: do not use in year of seeding. Apply after September 1, but before freeze-up.

Established shelterbelts: fall or early spring before weeds begin growth. Do not apply to frozen ground.

Weed Stage:

Pre-emergence in forage crops and shelterbelts.

Cost:

Forage crops: $6.38 per acre
Shelter belts: $28.38 to $42.57 per acre
(2000 suggested retail price).

Rates:

In forage crops, Princep Nine-T - 0.45 kg/acre.

Simazine 80W - 0.51 kg/acre.

Shelterbelts - Princep Nine-T - 2 to 3 kg/acre, Simazine 480 - 3.8 to 5.67 L/acre, Simazine 80W - 2.2 to 3.3 kg/acre.

Water Volume:

30 gallons/acre (135 L/acre). In shelterbelts, use a minimum of 50 gallons/acre (225 L/acre).

Pressure:

200 to 300 kPa (30 to 45 psi).

Nozzles:

Flat fan nozzles with 50 mesh or coarser nozzle screens.

How it Works:

Simazine is a systemic herbicide which is absorbed by roots. Photosynthesis is blocked.

Effects of Growing Conditions:

When applying to forage stands, dry soil conditions at the time of weed emergence may result in reduced weed control.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Moderate rainfall after application enhances activity.

Grazing: In forage stands, allow 30 days between application and grazing, 60 days between application and cutting for feed.

Recropping: Do not sow treated fields to any crop the year after application.

Aerial Application: Do not apply by air.

Storage: May be frozen. Store in a cool, dry place.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Non-labelled crops may be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison (Simazine 480)

Stampede EDF + 2,4-D or MCPA or Refine Extra

Herbicide Group – 7, 4/2
(Refer to page 20)

Company:

Rohm and Haas Canada Inc.

Formulation:

Stampede EDF - 80 percent propanil formulated as an extruded dry flowable. Container size - 10 kg.

Crops:

Barley, flax, oats, spring wheat (including durum), canaryseed, Kentucky bluegrass for seed (green foxtail suppression when applied alone).

See tank mix section for tank mixing/cropping restrictions.

Weeds Controlled:

Green foxtail plus all broadleaf weeds controlled by tank mix partner (2,4-D or MCPA or Refine Extra).

Crop Stage:

Cereals - 2 to 5 leaf stage. Best crop tolerance at the 3 to 4 leaf stage.

Canaryseed - 2 to 4 leaf stage.

Flax - 2 to 5 inches (5 to 12 cm) in height.

Temporary crop injury (yellowing and tip burning) may appear 2 to 5 days after application.

Weed Stage:

Green foxtail - 1 to 3 leaf stage and less than 1 inch (2.5 cm) in height.

See tank mix partner for broadleaf staging restrictions.

Cost:

Stampede EDF - $9.30/acre (not including cost of tank mix partner) (2000 suggested retail price).

Rates:

Apply 0.5 kg/acre (one 10 kg container treats 20 acres). For optimum green foxtail control, Stampede EDF must be tank mixed with a broadleaf product as listed in Tank Mix section.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

For standard ground sprayers, use a minimum of 10 gallons/acre (45 L/acre) water or reduced control may result. When using floater type equipment, apply in 15 gallons/acre (70 L/acre) water. Ensure that water temperature is at least 10°C. Do not apply with a spray coupe.

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan with 50 mesh or coarser nozzle and filter screens.

How it Works:

Stampede is a contact foliar herbicide. Affected weeds turn brown in 3 to 5 days. Because activity is contact, thorough coverage is essential. Do not apply under stressful conditions.

Effects of Growing Conditions:

This product can cause crop injury (severe burning, yellowing) under certain environmental conditions.

Do not spray when temperatures are below 15°C or when daytime high temperatures will exceed 30°C as severe crop injury will occur. Do not apply if crop is recovering from frost damage or if frost is expected within 24 hours. Crops damaged by winds should be fully recovered before applying Stampede. Best weed control is obtained when relative humidity is high and daily maximum temperatures range from 21 to 25°C. Poor control can be expected if top soil is dry to a depth of 2 inches (5 cm) or more.

Tank Mixes:

	Crop / Rate			
Tank Mix Partner	**Wheat (not including durum)**	**Durum Wheat**	**Barley, Oats**	**Flax, Canary Seed**
2,4-D Amine 500	0.32 L/acre	0.32 L/acre	Not registered	Not registered
2,4-D Ester 600	0.27 to 0.40 L/acre	0.27 to 0.40 L/acre	Not registered	Not registered
MCPA Amine/Ester	0.32 L/acre	0.23 L/acre	0.23 L/acre	0.23 L/acre
Refine Extra	8 g/acre*	8 g/acre*	8 g/acre*	Not registered

*Add a recommended surfactant such as Agral 90, Agsurf or Citowett Plus.

Allow a 3 day interval before or after application of Stampede EDF and other herbicides.

Do not apply Stampede after a field has been treated with a triazine herbicide (for example, Sencor, Bladex or simazine) unless all of the triazine residues have disappeared.

Fertilizers: None registered.

Insecticides: Decis may be applied as a tank mix with Stampede EDF. Allow 14 days between application of Stampede and dimethoate (Cygon) or malathion insecticides. Allow 5 days after applications of Stampede on wheat and 10 days on barley, prior to applying Furadan. Do not spray other insecticides the same season as Stampede. Severe crop injury can result if carbaryl (Sevin) or parathion methyl or Guthion are applied in the same crop year with Stampede.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 4 hours will reduce control.

Grazing: Do not graze treated crops or cut for hay prior to crop maturity.

Recropping: No restrictions the season after Stampede application.

Aerial Application: Do not apply by air.

Storage: Stampede EDF may be frozen.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Non-labelled crops can be severely injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison

Herbicide Group – 2
(Refer to page 20)

Sundance

(For use in the Dark Brown, Black and Grey Wooded soils of Manitoba and Saskatchewan with greater than 4% organic matter)

Company:

Monsanto Canada Inc.

Formulation:

75 percent sulfosulfuron formulated as a water dispersible granule. Container size – 432g per case.

Adjuvant: Merge – 8 L.

pH adjuster - 7 percent ammonium hydroxide solution. Container size: 4L jug.

Crop and Staging:

Spring wheat (including Kyle and Plenty durum) prior to emergence of the 4th tiller.

(Do not underseed forage legumes).

Weeds Controlled:

Grass: Foxtail barley, green foxtail[1], quack grass[1], wild oat.

Broadleaf: cleavers, common chickweed, dandelion[2], perennial sow-thistle[2], redroot pigweed, stinkweed, volunteer canola (NOT including CLEARFIELD canola), wild mustard.

[1] Suppression only

[2] Spring seedlings are controlled and established plants are suppressed.

Weed Stage:

Wild oat: From emergence to the 6 leaf stage with no more than 3 tillers. For optimum weed control and crop yield, apply prior to tillering.

Annual broadleaf weeds: Apply to the seedling stage for optimum weed control.

Perennial weeds: Prior to flowering when plants are actively growing.

Cost:

$16.98/acre (2000 suggested retail price including adjuvant).

Rates:

pH adjuster - add 1 L per 400 L of spray solution.
Sundance - 11g/acre or 40 acres/case
Plus: Merge at 0.2 L/acre.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

5 to 10 gallons/acre (23 to 45 L / acre)

Pressure:

275 kPa (40 psi)

Nozzles:

Flat fan. Choose nozzles that provide optimum spray distribution and coverage at the appropriate spray pressure. Do not use flood jet or controlled droplet application equipment.

How it Works:

Sundance is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing points of the plant. Growth of susceptible weeds stops soon after application. Symptoms include discoloration (yellowing, reddening, purpling) of new leaves and are visible 1-3 weeks after application, depending on growing conditions and susceptibility of target plants.

Effects of Growing Conditions:

For optimum results, do not apply to weeds growing under stress.

Tank Mixes:

Herbicides:

- 2,4-D ester (500 g/L formulation) at 0.340 L/acre for additional control of lamb's-quarters, wild buckwheat, volunteer CLEARFIELD Canola, stork's-bill, dandelion[2], narrow-leaf hawk's-beard[2], kochia, annual smartweed spp., and perennial sow-thistle[2].
- Pardner at 0.405 L / acre for additional control of weeds controlled by Pardner plus narrow-leaf hawk's-beard[3].

- MCPA ester (500 g/L formulation) at 0.385 L/acre for additional control of weeds listed on MCPA ester label plus narrow-leaf hawk's-beard[3], wild radish, volunteer sunflower, common plantain, and wild buckwheat[1].
- Buctril M at 0.405 L/acre for additional control of those weeds listed on the Buctril M label plus dandelion[2], hempnettle, velvetleaf, Canada thistle[1] and perennial sow-thistle[1].

[1] Suppression only

[2] Control of spring seedlings and season-long control of established plants.

[3] Spring Seedlings only

Fertilizers: None

Insecticides: None

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Do not apply if rain is forecast during, or soon after, application.

Grazing: Do not graze in the year of treatment.

Pre-harvest interval: No information available on label. Contact manufacturer for information.

Recropping: Wheat (including durum), canola, barley, peas and flax may be grown the year after application. In fields with areas where organic matter content is less than 4 percent and with soil pH greater than 7.0 seed only wheat or CLEARFIELD canola the year following application. Re-seed only to wheat in the year of application.

For all other crops, allow at least 22 months following application and conduct a field bioassay prior to planting.

Aerial Application: Do not apply by air.

Storage: Store under cool, dry conditions (below 50° C) away from foodstuffs, feed or seed.

Environment: Do not apply to water or contaminate water when draining sprayer. Maintain a buffer zone of 30m between the last spray swath and the edge of sensitive areas (shelterbelts, wood lots, or gardens). Leave a buffer zone of 6m between the last spray pass and wetlands or ponds. Use precautions to AVOID DRIFT. Drift may cause soil residues that will injure subsequent crops.

Tank Cleaning:

Do not drain or clean sprayer in an area where wastewater may drain into wells, other water bodies, or surrounding desirable vegetation. Flush tank, boom, and hoses with clean water for a minimum of ten minutes to remove all visible residues of the product. Fill the tank with water and add 1 L of household ammonia (minimum 3% ammonia content) per 100 L of rinse water and agitate. Flush solution through booms and hoses then top up tank with clean water. Agitate for 15 minutes, flush the hoses and booms again and then drain the tank. Remove nozzles and screens and clean separately with the ammonia solution as above. Repeat the ammonia rinse procedure as above. Thoroughly rinse the tank with clean water for at least 5 minutes, flush water through hoses and booms, and drain. Dispose of wash solution by spraying in a waste area or on the treated field.

Hazard Rating:

Sundance: Slight skin irritant.

Merge adjuvant: Warning poison; skin irritant.

pH adjuster: Caution corrosive.

Target/Sword

Herbicide Group – 4
(Refer to page 20)

Company:

Syngenta (Target)
United Agri Products (Sword)

Formulation:

275 g/L MCPA, 62.5 g/L mecoprop and 62.5 g/L dicamba formulated as a solution. Container size - 10 L.

Crops:

- Spring wheat[1] (including durum)[1]
- Barley[1]
- Oats[1]
- Canaryseed[1]
- Winter wheat[1]
- Fall stubble[1]
- Summerfallow[1]

Seedling grasses grown for forage:
- Creeping red fescue
- Crested wheatgrass
- Intermediate wheatgrass
- Meadow foxtail
- Orchardgrass
- Smooth bromegrass
- Timothy

Established forage grasses:
- Bromegrass (meadow, smooth)
- Fescue (creeping red, meadow, tall)
- Kentucky bluegrass
- Meadow foxtail
- Orchardgrass
- Timothy
- Wheatgrass (crested, intermediate, pubescent, slender, streambank, tall, western)

[1] Both Target and Sword are registered for these uses. All grasses are registered for treatment with Target only.

Note: Target is registered by the federal government for use on seedling and established forage grasses. The data used in granting this registration was developed by groups other than Syngenta. Syngenta provides no warranty and holds no liability with respect to weed control or crop tolerance for the use of Target on seedling forage grasses.

Weeds Controlled and Staging:

Weeds controlled at the 2 to 3 leaf stage unless otherwise indicated:

- Annual sow-thistle
- Ball mustard
- Cleavers (1-2 whorls)
- Common ragweed
- Corn spurry
- Cow cockle
- Flixweed
- Green smartweed
- Hemp-nettle (less than 2 pairs of true leaves)
- Knotweed
- Kochia
- Lady's-thumb
- Lamb's-quarters
- Night-flowering catchfly
- Prostrate pigweed
- Redroot pigweed
- Russian thistle (less than 2 inches (5 cm)
- Shepherd's-purse
- Stinkweed
- Tall mustard
- Tartary buckwheat
- Volunteer canola
- Volunteer sunflowers
- Wild buckwheat
- Wild mustard
- Wormseed mustard
- Yellow mustard

Top Growth Control:

- Canada thistle (6 to 8 inches (15 to 20 cm) and actively growing.)
- Field bindweed
- Hedge bindweed
- Perennial sow-thistle

Crop Stage:

Barley - 2 to 4 leaf stage.

Canaryseed, oats, wheat (spring and durum) - 2 to 5 leaf stage.

For optimum crop safety, apply at the 3 leaf stage of barley and the 3 to 4 leaf stage of wheat, oats, and canaryseed.

Winter wheat - spring application only; before the crop is more than 12 inches (30 cm) high (top leaf extended).

Seedling forage grasses - 2 to 4 leaf stage.

Established forage grasses - up to shot blade stage. Note, use only one application per year by ground.

Cost:

$4.96 to $7.44/acre (2000 suggested retail price).

Rate:

0.40 to 0.60 L/acre (one 10 L container treats 25 to 16.7 acres). Use the higher rate under adverse weather conditions, when weed density is high, for cleavers control, winter annual control and for suppression of Canada thistle and perennial sow-thistle.

Although Target is registered up to the 5 leaf stage of the crop for the rates listed here, the low rate should be used when the crop is at the 5 leaf stage for optimum crop safety.

For Canada thistle, postharvest or summerfallow application, use 0.81 L/acre (one 10 L container treats 12.4 acres).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

200 to 300 kPa (30 to 45 psi).

Nozzles:

Flat fan with 50 mesh screens and filters.

How it Works:

These products are systemic herbicides absorbed by foliage and roots and translocated throughout the plant. Symptoms include bending and twisting of stems and leaves within 3 to 7 days of application, and plant death 3 to 4 weeks after treatment.

Effects of Growing Conditions:

Hot and dry or cold and wet weather prior to spraying may result in reduced weed control and increased crop injury.

Do not apply within 2 weeks of a killing frost.

Tank Mixes:

Herbicides: Spring wheat (including durum) - Target may be tank mixed with Horizon.

Wheat and Barley - may be mixed with Sencor or linuron for chickweed control.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. ,General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze or harvest for livestock feed within 7 days of application.

Preharvest Interval: Do not apply within 80 days days of harvest.

Recropping: No restrictions the year after application.

Aerial Application: Target may be applied by air with a minimum of 3 gallons/acre (12 L/acre) water.

Storage: Do not freeze.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Non-labelled broadleaf crops can be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Thumper

Herbicide Group – 4, 6
(Refer to page 20)

Company:

Aventis CropScience

Formulation:

280 g/L bromoxynil and 280 g/L 2,4 D ester formulated as an emulsifiable concentrate. Container size - 8 L.

Crops and Staging:

Spring wheat (including durum) and barley at the 4 leaf to flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Weeds controlled at the 1 to 4 leaf stage:

American nightshade
Ball mustard
Bluebur
Cocklebur
Common ragweed
Cow cockle
Flixweed
Green smartweed
Kochia[1]
Lady's-thumb
Night-flowering catchfly
Pale smartweed
Redroot pigweed
Russian thistle[1]
Shepherd's-purse
Volunteer canola
Volunteer sunflower

[1] Control before plants are 2 inches tall.

Weeds controlled at the 1 to 8 leaf stage:

Common groundsel
Lamb's-quarters
Stinkweed
Tame buckwheat
Tartary buckwheat
Wild buckwheat
Wild mustard

Rates:

0.405 L/acre (one 8 L container treats 20 acres).

Cost:

$5.80/acre (2000 suggested retail price).

Water Volume:

5 - 10 gallons/acre (22 - 45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

80° or 110° flat fan nozzles. All strainer and nozzle screens must be 50 mesh or coarser.

How it Works:

Bromoxynil is a contact herbicide. Therefore, good coverage is essential. Susceptible weeds turn brown and die in 3 to 5 days. 2,4-D is absorbed through the leaves and is translocated throughout the plant, causing abnormal growth. Small burnt spots appear on leaves within hours, death of susceptible plants can take 2 weeks.

Effects of Growing Conditions:

Less than acceptable weed control may be expected if weeds are under stress because of excessive moisture, drought, or cool weather.

Tank Mixes:

Herbicides: In spring wheat (including durum) and barley, unless otherwise indicated, Thumper may be tank mixed with: Achieve, Avenge, Horizon*, Puma Super, Puma^{120} Super.

*Not for use on barley.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze or cut for livestock feed within 30 days of application. Withdraw meat animals 3 days before slaughter.

Recropping: No recropping restrictions the year after application.

Aerial Application: May be applied by air in 3 to 4 gallons/acre (12 to 16 L/acre) water. Use the higher volume when there is a heavy crop canopy, or when the majority of weeds are cow cockle, smartweed, or pigweed.

Storage: May be frozen.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Non-labelled crops can be severely injured by in-tank residues.

Do not clean equipment upslope of any water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison
Eye Irritant

Tordon 22K

Herbicide Group – 4
(Refer to page 20)

Company:

Dow AgroSciences

Formulation:

240 g/L picloram acid present as a potassium salt, formulated as a solution. Container size - 2 X 10 L jugs, 4 X 3.6 L jugs

Crop:

Permanent grass pastures, Rangeland and non-cropland.

Weeds Controlled:

Controls deep rooted perennial weeds such as Canada thistle, field bindweed, leafy spurge, pasture sage, perennial sow-thistle, povertyweed, Russian knapweed, toadflax, and biennial weeds such as diffuse knapweed, spotted knapweed, and scentless chamomile.

Weed Stage:

For best results, applications should be made when perennial weeds have fully developed, green leaves. Application in late summer (or periods of dry weather) when plants are not actively growing may result in unsatisfactory control.

Cost:

$39.75 per L (2000 suggested retail price).

Only available through Dow AgroSciences trained agents. Contact Dow AgroSciences for further information.

Rate:

Weed	Rate L/Acre	mL per 100 m²*
Scentless chamomile	0.445	11
Knapweed (diffuse, spotted)	0.910	22
Canada thistle, pasture sage, poverty weed, Russian knapweed, sow thistle	1.8	45
Leafy spurge, field bindweed, toadflax	3.6	90

* mix with 18 litres of water and apply 18 litres of spray solution per 100 m².

Water Volume:

35 to 70 gallons/acre (160 - 324 L/acre)

Pressure:

150 - 350 kPa (20 to 50 psi).

Nozzles:

Flat fan recommended. Non-target broadleaf plants are very sensitive to picloram drift. Avoid conditions that are conducive to drift. (See page 12 for drift control suggestions)

How it Works:

Picloram interferes with cell division, causing leaf cupping, stem distortion and eventual death. Picloram is absorbed through the leaves and roots.

IMPORTANT: Picloram is a very persistent and water soluble herbicide. Treated soil should not be moved from the treated area. Do not apply to soils that are permeable, have sinkholes, or lie over limestone bedrock. Do not apply to soils whose surfaces are composed of fractured rock or unconsolidated gravel. Application to these sites may allow the movement of herbicide to underlying water sources or aquifers. When applying Tordon 22K over sandy soils ensure that aquifers are not within 1.8 m of the soil surface. If shallow aquifers are present, do not apply Tordon 22K.

Tordon 22K must not be applied on range and pasture acres that are irrigated. Do no compost or mulch clippings from grass treated with Tordon 22K.

Effects of Growing Conditions:

Avoid spraying if temperatures exceed 28°C.

Tank Mixes:

None registered.

Restrictions:

Rainfall: Rain within 6 hours of application may cause poor results. **Heavy rainfall may dissolve and carry picloram away from the target area, or it may leach dissolved picloram out of the root zone or to undesireable locations.**

Grazing: Do not graze lactating dairy animals within 6 weeks after treatment. There are no grazing restrictions for other livestock. Do not use manure from animals grazing treated forage to fertilize susceptible plants or crops.

Recropping: Tordon 22K may persist in the soil for up to 5 years. For this reason Tordon 22K may only be applied on permanent grass pastures and rangeland unless applied by an authorized pesticide applicator. Avoid the root zone of desirable trees or shrubs.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Environment: This product is moderately toxic to fish. Apply this product well back from any water bodies to avoid contamination. Heavy rains can move this product from its application site down slope toward sensitive areas. Do not load or mix near wells, dugouts or other water bodies.

Tank Cleaning:

Tordon 22K can cause severe injury to sensitive crops (especially pulses and other broadleaf crops) at very low concentrations. Spray equipment should be flushed out immmediately after spraying Tordon 22K. The manufacturer recommends that equipment should be flushed twice with a water/household ammonia rinse (1 L of 3% ammonia per 100 L of water). All nozzles screens and filters should be removed and cleaned after use. Do not clean equipment upslope of water bodies or ditches near cropland or shelterbelts.

Hazard Rating:

Caution Poison.

Touchdown 480/XP

See Glyphosate sections on pages 123-135

Trifluralin

(Summerfallow use in the brown soil zone of Saskatchewan)

Herbicide Group – 3

(Refer to page 20)

Company:

Aventis CropScience (Rival 10G)
Dow AgroSciences (Advance, Heritage)
United Agri Products (Bonanza 10G)

Formulation:

Advance, Bonanza 10G, Rival 10G: 10 percent trifluralin formulated as a granule. Container size - 22.7 kg bag (all), Advance - 454 kg, Bonanza 10G - 500 kg, Rival 10G - 567 kg each in returnable mini bulk bags.

Heritage: 5% trifluralin formulated as a granule. Container size - 25 kg bag or 727 kg returnable mini bulk bag.

Crops:

Spring wheat (including durum) in the brown soils zone of Saskatchewan. Not for use in Manitoba.

Weeds:

Fallow Year:
Green foxtail
Wild oat
Persian darnel
Barnyard grass
Russian thistle
Wild buckwheat
Cow cockle
Lamb's-quarters
Redroot pigweed

Crop Year:
Green foxtail
Wild oat[1]
Lamb's-quarters
Wild buckwheat[1]

[1] Suppression only

Crop Stage:

Apply to summerfallow in May, June, or July for weed control during both years of a fallow-wheat rotation or in the fall (September or October) or spring prior to wheat seeding. Do not apply to stubble when the previous crop was treated with another trifluralin product (Treflan, Heritage, Advance, Rival or Bonanza). This includes application the previous summer or fall. Do not apply trifluralin to stubble or fallow when the previous year's crop was an oilseed, barley or pulse crop treated with a deep incorporated, spring or fall applied trifluralin product.

Weed Stage:

Pre-emergence. Will not control established weeds.

Cost:

$7.89 to $15.79/acre (2000 suggested retail price).

Rates:

	RATE (KG/ACRE)			
	5G Formulations		10G Formulations	
Soil Organic Matter (%)	1 to 3	4 to 8	1 to 3	4 to 8
May	7.7	9	3.85	4.5
June	6.5	7.7	3.25	3.85
July	5.3	6.5	2.65	3.25
	2-8% Organic Matter			
September to October	4.5[1]		2.75[1]	
Spring (April or May, in the year of seeding)	4.5[1]		2.75[1]	

[1] Control of green foxtail only.

During the fallow year, susceptible weeds may not be fully controlled until after the second fallow operation has established a uniform layer of treated soil. Control of wild oats in the crop year may be variable depending on wild oat population as well as soil and climatic conditions. Some wild buckwheat may escape but its growth will be retarded and result in limited competition to the wheat crop.

Application:

Do not apply to sandy soils with less than 1 percent organic matter. Application to severely eroded knolls is not recommended. Do not apply to wet soils, soils in poor working condition, soils which contain more than 8 percent organic matter, or soils subject to prolonged periods of flooding.

Granules may be applied to standing or pre-worked stubble, provided trash or green growth does not interfere with cultivation (prevent soil mixing).

Over-application caused by overlapping, improper calibration or non uniform application may result in reduced crop stand, delayed development or reduced yields.

Close applicator lid after filling to avoid prolonged exposure to direct sunlight.

Incorporation:

May - July: Apply granules to the soil surface and incorporate immediately, in the same operation if possible. Do not delay incorporation more than 24 hours after application. Use a deep tillage cultivator, field cultivator or disc implement set to work 2 to 3 inches (5 to 8 cm) deep, and operating at 8 to 10 km/hr. A second incorporation at the same depth and at an angle to the first should be done when weed growth requires it. Wait at least one week before making the second incorporation. After completing two fallow incorporations, additional operations with a rod weeder, shallow tillage or fall 2,4-D application may be required to control remaining weed growth.

September - October: Apply granules after harvest until freeze-up and incorporate immediately, in the same operation if possible with a deep tillage cultivator, field cultivator or disc implement set to work 2 to 3 inches (5 to 8 cm) deep. Do not delay incorporation more than 24 hours after application. A second incorporation may be done in the fall a minimum of 3 days later. Alternatively, in order to conserve trash cover throughout the winter, the second incorporation can be completed in the spring at the same depth and at an angle to the first incorporation. When both incorporations take place in the fall, shallow spring tillage should be completed in the spring. If a discer or air seeder is used for seeding, separate spring tillage may not be necessary.

Granules should not be incorporated when soil is crusted, lumpy or too wet for good mixing action. Fall application is not recommended on soils where a lack of trash cover combined with the required incorporation would leave the soil vulnerable to erosion.

Spring (April - May): Apply granules and incorporate immediately, in the same operation if possible. Do not delay the first incorporation more than 24 hours after application. The second incorporation must be delayed a minimum of 3 days following the first incorporation. When applied to cold soils, wait 14 days before making second incorporation. The second incorporation should be done at an angle to the first incorporation, and at the same depth. If a discer or air seeder is used for seeding, the seeding operation can be used as the second incorporation.

Seeding:

Allow soil to warm before seeding to reduce risk of injury to crop. Place seed 1.25 to 2.5 inches (3 to 6 cm) deep. If spring seedbed preparation is required, set cultivator 2 inches (5 cm) deep. To reduce the risk of wheat injury, use good quality seed and agronomic practices which will promote good growing conditions. Avoid deep seeding, loose seedbeds and seeding into cold soils. If extended dry periods were present after a fallow application, a 10 percent increase in seeding rate is recommended.

How it Works:

Trifluralin controls susceptible weeds by killing seedlings as they germinate. If the shoot escapes the soil surface, the roots continue to be inhibited, resulting in a less competitive plant. Trifluralin does not control established weeds.

Effects of Growing Conditions:

Prolonged drought conditions after a May-July application to fallow may result in higher levels of trifluralin in the soil at the time of seeding. If conditions are not conducive to rapid emergence and growth of the wheat crop (for example cold or dry soil conditions) injury can occur.

Restrictions:

Rainfall: Once the product is incorporated into the soil, rainfall has no effect.

Grazing: Do not graze or cut for hay; insufficient data to support such use.

Recropping: Oats, canaryseed and small seeded forage grasses such as timothy and creeping red fescue should not be grown in rotation following a trifluralin treated crop.

Aerial application: Do not apply by air.

Storage: Store in a cool, dry location, out of direct sunlight.

Hazard Rating:

Danger Poison.

Trifluralin (Green and Yellow Foxtail Control in Cereals)

Herbicide Group – 3
(Refer to page 20)

Company:

Aventis CropScience (Rival)
Dow AgroSciences (Advance, Treflan)
United Agri Products (Bonanza)

Formulations:

Advance 10G - trifluralin formulated as a 10 percent granular in 22.7 kg and 454 kg bags.

Bonanza 10G - trifluralin formulated as a 10 percent granular in 22.7 kg and 500 kg bags.

Bonanza 400 - trifluralin formulated as a 400 g/L emulsifiable concentrate in 10 L, 115 L, 205 L containers.

Rival 10G - trifluralin formulated as a 10 percent granular in 22.7 kg, 567 kg bags.

Rival DF - trifluralin formulated as a 60 percent dry flowable in 7.5 kg bags.

Rival EC - trifluralin formulated as a 500 g/L emulsifiable concentrate in 9 L, 110 L, 200 L, 900 L containers.

Treflan EC - trifluralin formulated as a 480 g/L emulsifiable concentrate in 9.45 L, 115 L containers.

Treflan QR5 - trifluralin formulated as a 5 percent granular in 25 kg, 725 kg bags.

Crops:

Liquids applied in spring only - spring wheat (including durum), barley.

Granulars applied in fall only - spring wheat (including semidwarf and durum).

Weeds:

Green and yellow foxtail only.

Crop Stage:

Liquid and dry flowable formulations - spring applications only. After seeding but prior to crop emergence.

Granular formulations - fall applications only. After September 1 but before freeze-up.

Weed Stage:

Pre-emergence.

Rates:

LIQUID OR DRY FLOWABLES

PRODUCT	RATES (L OR KG/ACRE)	
	LIGHT AND MEDIUM SOIL TEXTURE	HEAVY SOIL TEXTURE
Rival EC	0.49 to 0.57 L	0.65 L
Rival DF	0.4 to 0.49kg	0.53 kg
Treflan EC	0.49 L	0.69 L
Bonanza 400	0.57 L	0.85 L

GRANULARS (WHEAT ONLY)

PRODUCT	RATES (KG/ACRE)
	All soils (2 - 8% organic matter)
Advance 10G/Rival 10G/Bonanza 10G	2.23
Treflan QR5*	4.45

*Spring applications of Treflan QR5 may also be made at the same rate during the months of April and May only in soils between 2 to 6% organic matter.

Cost:

Liquids and dry flowables - $6.27 to $10.03/acre.

Granulars - $6.77/acre (2000 suggested retail prices).

Water Volume:

10 gallons/acre (45 L/acre) - liquid and dry flowable formulations only.

Pressure:

275 kPa (40 psi) - liquid and dry flowable formulations only.

Nozzles:

Flat fan - liquid and dry flowable formulations only.

Incorporation:

Liquid or dry flowable formulations - Apply and incorporate in spring just after seeding. Incorporate to a depth of 1 to 1.5 inches (2 to 4 cm) into a trash-free soil (80 percent black when viewed from above) using diamond or tyne type harrows operated at a speed of 6 mph (9 km/h). Incorporate twice, with the second incorporation at right angles to the first. The first incorporation should be performed immediately in the same direction of application. Both incorporations should be done within 24 hours of application. When tank mixing liquid formulations with Avadex BW, follow the same incorporation procedure.

Granular formulations - May be applied to standing or pre-worked stubble. Very heavy trash fields should be worked prior to application to allow product penetration to the soil surface. Incorporate with cultivators or disc implements only. Perform the first tillage operation within 24 hours of application. Incorporate at a working speed of 5 to 8 mph (8 to 13 km/hr) and to a depth of 2 to 3 inches (5 to 8 cm). Wait a minimum of 5 days, then incorporate a second time at right angles to the first. This second incorporation may be delayed until the following spring. Subsequent working should be no deeper than 2 to 3 inches (5 to 8 cm).

How it Works:

Trifluralin inhibits growth of root and shoot tips as weeds germinate and begin to emerge. If the shoot portion of affected plants escapes to the soil surface, lateral and secondary root growth continues to be inhibited, which may result in a less competitive plant.

Effects of Growing Conditions:

When using fall applications of the granular formulations, crop injury will occur if soil conditions are not conducive to rapid wheat emergence (for example, cold or dry soil conditions). Weed control is best when soil moisture conditions are good.

Rainfall has no direct effect on product activity. Flooding (3 to 5 days) will cause the rapid breakdown of the product, resulting in reduced weed control. Flooding for 3 weeks or more will result in total product breakdown and loss of weed control.

Tank Mixes:

Herbicides: Liquid trifluralin and Rival DF may be tank mixed with Avadex BW/Avadex MicroActiv.

Fertilizer: Liquid trifluralin and Rival DF may be applied with liquid fertilizer (for example 28-0-0) as a carrier. Conduct a compatibility test before mixing.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: None. Flooding can reduce weed control.

Grazing: Do not graze the treated crop or cut for feed prior to crop maturity.

Aerial Application: Do not apply by air.

Recropping: Do not sow tame oats, canaryseed or small seeded forage grasses one year after spring applications or 21 months after fall applications.

Storage: Granular formulations must be stored in a cool, dry location, out of sunlight.

Rival EC - Do not store below 5°C.

Treflan E.C. - Do not freeze.

Bonanza 400 - Do not freeze.

Recommendations for liquid formulations: Crystalization of the active ingredient may occur at less than 5°C. To reconstitute, bring temperature to 15°C and shake well until no crystals are visible. This should be done before adding to the spray tank.

Tank Cleaning:

Immediately after spraying, throughly clean with a water/detergent mix.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Keep out of reach of children.

Trifluralin (Broadleaf and Grassy Weed Control)

Herbicide Group – 3
(Refer to page 20)

Company:

Aventis CropScience (Rival)
Dow AgroSciences (Advance, Treflan)
United Agri Products (Bonanza)

Formulations:

Advance 10G - trifluralin formulated as a 10 percent granular in 22.7 kg and 454 kg bags.

Bonanza 400 - trifluralin formulated as a 400 g/L emulsifiable concentrate in 10 L, 115 L, 205 L containers.

Bonanza 10G - trifluralin formulated as a 10 percent granular in 22.7 kg, 500 kg bags.

Rival EC - trifluralin formulated as a 500 g/L emulsifiable concentrate in 9 L, 110 L, 200 L, and 900 L containers.

Rival 10G - trifluralin formulated as a 10 percent granular in 22.7 kg, 567 kg bags.

Rival DF - trifluralin formulated as a 60 percent dry flowable in 7.5 kg bags.

Treflan EC - trifluralin formulated as a 480 g/L emulsifiable concentrate in 9.45 L, 115 L containers.

Treflan QR5 - trifluralin formulated as a 5 percent granular in 25 kg, 725 kg bags.

Crops:

Certain formulations are not registered for all the crops listed here. Refer to the specific product label for details.

Spring applied liquid, dry flowable or granular formulations - canola, peas, sunflowers, safflower (liquid formulations), dry beans, mustard, fababeans, alfalfa, sainfoin, sweet clover, soybeans, forage legumes (cicer milk-vetch, seedling alsike clover, red clover, bird's-foot trefoil).

Fall applied granular formulations - canola, peas, sunflowers, dry beans, mustard, fababeans, soybeans, barley, lentils and flax.

Trifluralin liquids, Rival DF - prior to planting shelterbelt transplants (elm, caragana, green ash, Scots pine).

Weeds:

Annual brome species
  (downy, Japanese)
Barnyard grass
Chickweed
Cow cockle
Green foxtail
Knotweed
Pigweed
Lamb's-quarters
Persian darnel
Purslane
Russian thistle*
Wild buckwheat
Wild oats
Yellow foxtail

*Bonanza only.

Crop Stage:

Preplant incorporated.

Weed Stage:

Pre-emergence.

Costs:

Liquids or dry flowable - $8.55 to $15.19/acre.

Granulars - $10.45 to $17.24/acre

(2000 suggested retail prices).

Water Volume:

10 gallons/acre (45 L/acre) (liquid or dry flowable products only).

Pressure:

275 kPa (40 psi) (liquid or dry flowable products only).

Nozzles:

Flat fan (liquid or dry flowable products only).

Incorporation:

Granular formulations are recommended for use in fall or spring as a preplant incorporated treatment on broadleaf crops listed on the product label. The liquid or dry flowable formulations should be used only on soils free of lumps and relatively trash-free (75 percent black) and are recommended only for spring use. Granular formulations may be applied to standing or pre-worked stubble. Very heavy trash fields should be worked prior to application to allow product penetration to the soil surface. Do not use liquid or dry flowable formulations of trifluralin as a preplant incorporated treatment in barley, as severe injury will result. Only the fall applications of Advance 10G, Rival 10G, Bonanza 10G or Treflan QR5 are registered for use as preplant incorporated treatments in barley.

For fall application of granular formulations, work the chemical into the soil between September 1 and freeze-up. Use a discer or field cultivator (vibrating shank-type). Disc implements are preferred on stubble. Set equipment to cut at 3 to 4 inches (8 to 10 cm) depth. The initial incorporation should be done within 24 hours of application. The second incorporation should be done at right angles to the first.

The second incorporation may be delayed until spring, except when planting barley, flax or lentils; for these crops both incorporations must be done in fall. Delay the second incorporation 5 days for better weed control. This will allow greater release of the chemical onto soil particles and assure more even distribution. Fall application of granular trifluralin on flax, lentils or barley is not recommended on soils prone to erosion, as the 2 fall incorporations necessary in these crops may leave soils vulnerable to wind or water erosion.

For spring application of liquid and granular formulations, work the chemical into the soil prior to seeding by setting the implement at 3 to 4 inches (8 to 10 cm) cutting depth. The first incorporation must be done within 24 hours of application. The second incorporation must be done at right angles to the first. If incorporating granular trifluralin, delay the second incorporation for 3 days after the first to achieve better weed control.

How it Works:

Trifluralin inhibits growth of root and shoot tips as weeds germinate and begin to emerge. If the shoot portion of affected plants escapes to the soil surface, lateral and secondary root growth continues to be inhibited, which may result in a less competitive plant.

Effects of Growing Conditions:

Injury to flax, barley or lentils may occur if soil and weather conditions are not conducive to rapid crop emergence (cold or dry soils at the time of seeding and crop emergence).

To minimize crop injury, seed into a firm, moist seed bed. Use a press drill or hoe-drill. Sow barley no deeper than 2 inches (5 cm). Sow lentils and flax no deeper than 1.5 inches (4 cm).

Less than acceptable weed control will result if dry conditions prevail at the time of weed emergence.

Rainfall has no direct effect on products' activity. Flooding (3 to 5 days) will cause rapid breakdown of the product resulting in reduced weed control. Flooding for 3 weeks or more will result in total breakdown of the product resulting in loss of weed control.

Tank Mixes:

Herbicides:

Fababeans - Treflan EC may be tank mixed with Sencor 75 DF or Sencor 500.

Peas - Treflan EC may be tank mixed with Sencor.

Soybeans - Treflan EC can be tank mixed with Sencor 500 (use only on KG 20 or McCall). This mixture may cause injury to soybeans if seedlings are weak or slow to emerge.

Dry beans (white and red kidney only) - Treflan and Rival (liquid formulations) may be tank mixed with Eptam 8-E.

Fertilizers: Liquid product and Rival DF may be applied with liquid fertilizer as a carrier. Before the herbicide is added to the tank, compatibility of the herbicide to liquid fertilizer should be tested following instructions on the herbicide container. Trifluralin liquids may be blended with dry bulk fertilizers (do not mix with nitrate fertilizers). Check label for blending instructions.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Rates:

For use in canola, peas, sunflowers, dry beans, mustard, fababeans, seedling alfalfa (spring only), seedling sweet clover (spring only), soybeans. Apply:

PRODUCT	SOIL TYPE			
	Light soils with less than 6% organic matter		Medium to heavy soils with 6 - 15% organic matter	
	Spring	Fall	Spring	Fall
Advance 10G	Not registered	4.45 kg/acre	Not registered	5.67 - 6.88 kg/acre
Rival EC	0.65 L/acre	0.89 L/acre[1]	0.89 - 1.13 L/acre	1.13 - 1.37 L/acre[1]
Rival 10G	3.43 kg/acre[2]	4.45 kg/acre	4.45 - 5.67 kg/acre[2]	5.67 - 6.88 kg/acre
Rival DF	0.53 kg/acre	0.73 kg/acre[1]	0.73 - 0.93 kg/acre	0.93 kg/acre[1]
Treflan EC	0.69 L/acre	0.93 L/acre[1]	0.93 - 1.21 L/acre	1.21 - 1.37 L/acre[1]
Treflan QR5	6.9 kg/acre[2]	8.9 kg/acre	8.9 - 11.3 kg/acre[2]	11.3 - 13.8 kg/acre
Bonanza 10G	Not registered	4.45 kg/acre	Not registered	5.67 - 6.88 kg/acre
Bonanza 400	0.81 L/acre	1.11 L/acre[1]	1.11 L/acre	1.42 L/acre[1]

[1] Although liquid and dry flowable formulations are registered for fall application, this use is not recommended as tillage requirements before and after application will predispose fields to erosion.

[2] Spring applications of granular formulations is recommended for Manitoba only.

For use in barley (fall only), apply:

	SOIL TYPE					
	2-4% organic matter		4 - 6% organic matter		6-10 % organic matter	
PRODUCT	Light Soil Texture[1]	Medium to Heavy Soil Texture[2]	Light Soil Texture[1]	Medium to Heavy Soil Texture[2]	Light Soil Texture[1]	Medium to Heavy Soil Texture[2]
Advance 10G	3.44 kg/acre	4.45 kg/acre	4.45 kg/acre	5.67 kg/acre	Not recommended	Not recommended
Rival 10G, Bonanza 10G	3.44 kg/acre	3.44 kg/acre	4.45 kg/acre	4.45 kg/acre	4.45 kg/acre	5.67 kg/acre
Treflan QR5	6.9 kg/acre	8.9 kg/acre	8.9 kg/acre	11.3 kg/acre	Not recommended	Not recommended

[1] Light textured soils can be defined as Sandy to Sandy loam.

[2] Medium to Heavy textured soils can be defined as loam to clay.

For use in flax or lentils (fall only), apply:

PRODUCT	SOIL TEXTURE	
	Light textured soils with less than 6% organic matter	**Medium to heavy textured soils with 6-15% organic matter**
Advance 10G, Rival 10G, Bonanza 10G	4.45 kg/acre	5.67 - 6.88 kg/acre
Treflan QR5	8.9 kg/acre	11.3 - 13.8 kg/acre

Restrictions:

Rainfall: None. Flooding may reduce weed control.

Grazing: Do not graze the treated crops or cut for feed prior to crop maturity.

Recropping: Oats, canaryseed, and small-seeded grasses may be affected the year after treatment. Corn is sensitive at higher rates of application. Damage to wheat can occur if the crop is seeded into land that has been treated during the previous 21 months with trifluralin products and has received abnormally low amounts of precipitation. Damage is worse if conditions are not conducive to rapid emergence of the wheat (for example, if the crop is seeded deep or if soil conditions remain cool during emergence). Damage tends to be greater on fields treated with granular formulations.

Aerial Application: Do not apply by air.

Storage: Granular formulations must be stored in a cool, dry location, out of sunlight.

Rival EC - Do not store below 5°C.

Treflan E.C. - Do not freeze.

Bonanza 400 - Do not freeze.

Recommendations for liquid formulations: Crystalization of the active ingredient may occur at less than 5°C. To reconstitute, bring temperature to 15°C and shake well until no crystals are visible. This should be done before adding to the spray tank.

Tank Cleaning:

Immediately after spraying, thoroughly clean with a water/detergent mix.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Keep out of reach of children.

Triumph Plus

Herbicide Group – 1, 2, 4
(Refer to page 20)

Company:

Aventis CropScience

Formulation:

The Triumph Plus package contains 4 containers: 2 labelled "Triumph FM" and 2 labelled "Plus".

"Triumph FM" contains 56 g/L fenoxaprop-p-ethyl and 256 g/L MCPA ester formulated as an emulsifiable concentrate. Container size - 13.3 L.

"Plus" contains 75 percent thifensulfuron methyl formulated as a dry flowable. Container size - 162 g.

Crops and Staging:

Spring wheat (not including durum)- 2 to 6 leaf stage, maximum 3 tillers

Seedling forage grasses at the 2 to 4 leaf stage:
Bromegrass (meadow and smooth)
Creeping red fescue
Tall fescue
Wheatgrass (intermediate, northern, slender, tall, western)

Crop injury (yellowing, stunting and in some instances pinching of tillers) can occur with applications of Triumph Plus made beyond the recommended leaf stage. Roblin wheat is particularly sensitive to applications of Triumph Plus made at leaf stages beyond the recommended range. To minimize the risk of injury, apply the product within the recommended range.

Weeds and Staging:

Grass weeds controlled at the 1 to 6 leaf stage with a maximum of 2 tillers. Apply at the 2 to 3 leaf stage for optimum control:

Foxtail (green and yellow)
Wild oats

Broadleaf weeds controlled at the 2 to 4 leaf stage or less than 4 inches (10 cm) across, unless othewise stated:

Annual sunflower
Ball mustard
Burdock
Canada thistle[1]
Chickweed (1 to 6 leaf)
Cocklebur
Corn spurry
Cow cockle
Field horsetail[2]
Flixweed[3]
Green smartweed
Hemp-nettle
Hoary cress[2]
Kochia
Lady's-thumb
Lamb's-quarters
Mustards (except dog and green tansy)
Plantain[2]
Prickly lettuce
Ragweeds
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's-purse[3]
Stinkweed[3]
Vetch
Volunteer canola[4]
Wild buckwheat (1 to 3 leaf)
Wild mustard
Wild radish

[1] Suppression only
[2] Top growth control only
[3] Spring seedlings only
[4] May not give satisfactory control of CLEARFIELD canola varieties

Cost:

$20.35/acre (2000 suggested retail price).

Rates:

The Triumph Plus package will treat 40 acres.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Water Volume:

5 to 10 gallons/acre (23 to 45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

80° or 110° stainless steel flat fan nozzles tilted forward at a 45° angle. Screens 50 mesh or larger.

How it Works:

Triumph Plus is a systemic herbicide that is translocated throughout treated plants. Symptoms on grassy weeds include reduced leaf growth and chlorosis (yellowing) of treated leaves within 1 to 3 days. Yellowing progresses and death of grassy weeds occurs 14 to 21 days after application. Broadleaf weeds are affected by two different components in Triumph Plus. MCPA causes rapid, abnormal, undifferentiated growth in weeds which results in plant death. Plus is usually slow to act and symptoms, which include discolouration (reddening, purpling or yellowing), may not be noticeable for 1 to 3 weeks after application.

Effects of Growing Conditions:

Do not apply to crop that is stressed by severe heat, frost, low fertility, drought, water-saturated soil, disease or insect damage as crop injury and poor weed control may result.

Tank Mixes:

Herbicides: In spring wheat (not durum), Triumph Plus may be tank mixed with 0.085 L/acre of Lontrel.

Fertilizers: None registered.

Insecticides: None registered.

Do not tank mix with any other chemical additive, pesticide or fertilizer. Do not use a surfactant with this tank mix. An interval of 7 days prior to application, or 4 days after application with Triumph Plus, is required before any other pesticide can be applied.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 2 hours may reduce weed control.

Grazing: Do not graze treated crops or cut for feed prior to crop maturity.

Preharvest: Do not apply within 80 days of harvest.

Recropping: No restrictions the year after treatment.

Aerial Application: Do not apply by air.

Storage: Do not freeze. If stored for 1 year or longer, shake well before using.

Environment: Do not apply within 15 m of a body of water or wetland area.

Tank Cleaning:

The "Plus" component of Triumph Plus can cause severe injury to sensitive crops at very low concentrations. Sprayers used to apply Triumph Plus should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia (1L of 3% household ammonia per 100 L water) rinse prior to using the sprayer on sensitive crops. All nozzles, screens and filters should be removed and cleaned after applying this product. Refer to label for detailed clean out instructions.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Warning Poison

Skin and Eye Irritant

Unity

(Not for use in Manitoba)

Herbicide Group – 2,6

(Refer to page 20)

Company:

Aventis CropScience

Formulation:

Unity 280 EC - 280 g/L bromoxynil formulated as an emulsifiable concentrate.

Unity 75 WG - 75 percent triasulfuron formulated as a dispersible granule.

Container size - one case of Unity 280 EC plus Unity 75 WG contains 2 x 4 L jugs of Unity 280 EC and 4 x 43 g water soluble bags of Unity 75 WG.

Crops and Staging:

Spring wheat (including durum), and barley at the 2 leaf to just prior to flag leaf. For use in the brown and dark brown soil zones of Saskatchewan only.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Weeds controlled at the 2 to 4 leaf stage:

Chickweed
Cleavers
Cow cockle
Flixweed
Green smartweed
Hemp-nettle
Kochia
Lady's-thumb
Lamb's-quarters
Redroot pigweed
Shepherd's-purse
Stinkweed
Wild buckwheat
Wild mustard
Volunteer canola

Caution:

Several crops are sensitive to low concentrations of Unity 75 WG in the soil. Therefore, careful consideration should be given to crop rotation plans prior to using. The Unity tank mix is registered for use in Saskatchewan in the brown and dark brown soil zones only. The degradation of Unity 75 WG in the soil is affected by rainfall, soil temperature and soil pH. If you are considering using this product, be sure to read the recropping restrictions outlined in the product label.

Cost:

$6.90/acre (2000 suggested retail price).

Rates:

One case treats 40 acres. Add a recommended non-ionic surfactant such as Citowett Plus, Agral 90, Agsurf, Super Spreader Sticker or Companion at 0.25 L per 100 L spray solution.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan. 50 mesh screens or coarser.

Mixing Instructions:

Add Unity 75 WG water soluble bags first to 1/4 full sprayer. Allow at least 6 minutes for complete mixing. Add Unity 280 EC. Allow a further two minutes mixing. Fill sprayer, and add surfactant. Do not allow mixture to stand without agitation.

How it Works:

The Unity tank mix is absorbed through the leaves of emerged weeds and is rapidly translocated to the growing points of roots and shoots, where growth is inhibited. Visual symptoms take 1 to 3 weeks to appear, and death usually occurs in 3 to 4 weeks.

Effects of Growing Conditions:

Adequate control may not be achieved under unfavourable conditions such as drought, flooding or prolonged temperature extremes.

Tank Mixes:

Herbicides: May be tank mixed with:

Horizon - spring wheat (including durum)

Puma™ Super - spring wheat (including durum) and Barley

Puma Super - spring wheat (not including durum)

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Do not apply if rainfall is expected within 2 hours.

Grazing: Do not graze treated crops or cut for hay until 30 days after application.

Recropping: Some crops have shown a high sensitivity to low residues of Unity 75 WG in the soil. The risk of injury to rotational crops is affected by a number of factors including soil factors (soil type and soil pH), environmental factors (soil temperature, precipitation), crop species, and recropping interval. Breakdown in soil of Unity 75 WG is more rapid with conditions of high moisture, high temperature, and low pH.

To avoid injury to subsequent crops after an application of recommended rates of the Unity tank mix, the following recropping intervals should be observed:

CROP	MINIMAL INTERVAL (MONTHS)		
	Soil pH 6.4 or less	Soil pH 6.5 - 7.4	Soil pH 7.5 or greater
Spring Wheat (hard red, Canada prairie, extra strong)	No Restrictions	No Restrictions	No Restrictions
Barley, Oats, Durum Wheat	10	10	10
Flax	10	10	22
Peas	10	22	22
Canola	10	22	34
Canaryseed	22	22	22
Mustard	22	22	34
Lentils, Sunflowers, All other crops	Bioassay	Bioassay	Bioassay

A field bioassay involves growing test strips of the crop(s) intended for production the following year in fields previously treated with the Unity tank mix. Crop response will dictate whether or not to rotate to the crop(s) used in the test strip. See Bioassay Guidelines section of product label. Apply the Unity tank mix only once per year to the same field.

Aerial application: Do not apply by air.

Storage: Do not freeze.

Environment: Leave at least a 15 m buffer zone around wildlife habitat. Do not apply to irrigated land.

Tank Cleaning:

Unity can cause injury to sensitive crops at low concentrations. Clean sprayer immediately after use. Do not clean near desirable vegetation, wells or other water sources. Drain and flush tank and boom with water and household detergent. Add 1 L household ammonia (3 percent) and 100 L water to spray tank and allow to agitate for 15 min. before flushing through nozzles. Wash nozzles and screens in the water/ammonia mix in pail. Rinse system with clean water for 5 minutes.

Hazard Rating:

Warning Poison

Velpar DF

Herbicide Group – 5
(Refer to page 20)

Company:

DuPont Canada Inc.

Formulation:

Velpar DF: 75 percent hexazinone formulated as a water dispersible granule - Container size: 2 kg.

Crops:

Established alfalfa for seed.

Weeds:

Dandelion
Quackgrass
Sow-thistle
Narrow-leaf hawk's beard
Scentless chamomile

Crop Stage:

Apply in late fall prior to freeze-up when alfalfa is dormant or in early spring before alfalfa growth resumes. Apply only on alfalfa that has been established for 18 months or longer. If burning or irrigation is to be carried out, do not apply until these operations have been completed.

Weed Stage:

Dormant (after growth has ceased in fall or prior to growth resuming in spring).

Do not apply to frozen ground.

Cost:

$20.35 to $40.73/acre (2000 suggested retail price).

Rates:

Velpar DF - 0.272 to 0.544 kg/acre. Use the lower rate on medium-textured soils with low organic matter. Do not apply to soils with less than 1 percent organic matter.

Water Volume:

20 gallons/acre (90 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan.

How it Works:

Velpar is a systemic herbicide readily absorbed through the roots and foliage. It is translocated upwards, where it inhibits photosynthesis.

Effects of Growing Conditions:

Adequate soil moisture is required for activation of the product.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Rainfall is beneficial for activation of the product.

Grazing: Do not graze the treated crop or cut for feed.

Recropping: Insufficient information is available. Velpar residues will persist for 2 or more years after application.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Non-labelled crops may be injured by in-tank residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Danger Corrosive
Caution Flammable

Venture 25 DG / Venture L

Herbicide Group – 1
(Refer to page 20)

Company:

Syngenta

Formulation:

Venture 25 DG - 25 percent fluazifop-p-butyl formulated as a dispersable grain. Container size- 6.4 kg plus 2 x 8 L Charge adjuvant or 1 x 8 L Turbocharge adjuvant.

Venture L - 125g/L fluazifop-p-butyl formulated as an emulsifiable concentrate. Container size 2 x 8 L.

Crops:

Alfalfa
Bird's-foot trefoil
Canola
Clover
Creeping red fescue
Flax (including Solin- low linolenic varieties)
Lentils
Mustard
Peas
Potatoes[1]
Soybeans[1]
Sunflowers

[1] Venture L only

Crop Stage:

Venture DG - broadleaf crops are tolerant at all stages.

Venture L - No restrictions except where specified in adjacent table.

Preharvest intervals must be followed with both products to avoid unacceptable residues of fluazifop-p-butyl in harvested crops.

Crop	Crop Stage	Harvest Interval
Alfalfa	No restrictions	41
Bird's-foot trefoil and red clover	No restrictions	Do not graze or feed in year of treatment
Canola	Do not apply past 5th leaf	80
Creeping red fescue	2-5 leaf	For seed only
Flax	No restrictions	80
Lentil	Do not apply past 6th node	70
Mustard	Do not apply past 5th leaf	75
Peas	No restrictions	66
Potatoes	No restrictions	90
Soybeans	Up to 3rd trifoliate leaf	90
Sunflowers	No restrictions	120

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Rates:

Weed	Venture DG		Venture L	
	Rate (kg/acre)	Acres treated per 6.4 kg container	Rate (L/acre)	Acres treated per 8 L container
Volunteer corn	0.12	52.7	0.24	33
Volunteer wheat and barley, persian darnel, barnyard grass	0.16	40	0.32	25
Wild oats	0.16	40	0.40	20
Quackgrass suppression in canola and soybeans[1]	0.20	32	0.40	20
Green and yellow foxtail	0.28	22.6	0.57	14
Quackgrass suppression (all crops)	0.28	22.6	0.80	10

[1] Venture L only registered in soybeans.

Weed Stage:

2 to 5 leaf stage for annual grasses, except green and yellow foxtail (2 to 4 leaf stage). Apply at the 2 to 3 leaf stage of annual grasses for optimum control.

Quackgrass - 3 to 5 leaf stage.

Cost:

Venture DG- $8.44 to $19.69/acre (2000 suggested retail price)
Venture L- Not available

Water Volume:

Venture DG - 5 to 10 gallons/acre (23 to 45 L/acre)
Venture L - 5 to 20 gallons/acre (20 to 80 L/acre).

Pressure:

Venture DG - 275 kpa (40 psi)
Venture L- 200 to 400 kPa (30 to 60 psi)

Nozzles:

80° or 110° flat fan nozzles.

Venture DG - All strainer and nozzle screens must be 50 mesh or coarser.

Mixing Instructions:

Venture DG - Fill the sprayer three-quarters full of water. Start the agitation system and continue agitating throughout the mixing and loading procedure. Add the Venture 25DG slowly to the tank. Venture 25DG must be added directly through the tank opening into the water. Add all the Venture required to the tank, wait 1 minute for the Venture grains to disperse, add the broadleaf chemical (if tank mixing) and then add the required amount of Turbocharge adjuvant. Fill the sprayer to the desired level with water. Continue to agitate until spraying is complete.

Venture L - No specified instructions.

A general guide to mixing can be found on page 13.

How it Works:

Venture is a systemic herbicide that is absorbed through foliage and translocated from treated leaves to growing points within plants. Symptoms include yellowing of newest leaves within 1 to 3 days, which leads to browning and plant death 21 to 28 days after treatment.

Effects of Growing Conditions:

Less than acceptable weed control may be expected if weeds are under stress because of excessive moisture, drought, or cool weather.

Tank Mixes:

Herbicides: Tank mix options for :

CROP	VENTURE DG	VENTURE L
Canola	Muster (Argentine varieties only)	
	Lontrel	
	Liberty (1.1 L/acre) plus Venture DG at 0.04 to 0.08 kg/ha for volunteer barley control in Liberty Link varieties.	Not registered
Canola or Flax	Select (0.03 L/acre) plus Venture DG at 0.08 kg/acre. Add Amigo and/or Turbocharge at 0.5 to 1 L per 100 L spray solution.	Not registered
Alfalfa and Bird's-foot trefoil	2,4-DB	Not registered
Field Peas	Pursuit (0.085 L/acre) plus Venture DG at 0.28 kg/acre*	Not registered
Creeping red fescue	Ally at 2 to 3 g/acre at the 2 to 5 leaf stage	
Soybeans	Not registered	Basagran. Add Assist at 0.5 L per 100 L of spray solution.
Potatoes	Not registered	Sencor*

*Reduced grass weed control from Venture may result

Fertilizers: none registered.

Insecticides: none registered.

When applying other broadleaf herbicides in the same field, apply the product no sooner than 3 days after application of Venture. Adding ingredients in the correct order is critical for optimum performance. Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze crops or cut for hay in the year of treatment.

Preharvest Interval: See crop stage section.

Recropping: Seed only broadleaf crops listed on this label if seeding must occur within 60 days of Venture L application.

Aerial Application: Do not apply by air.

Storage: Product is not affected by temperatures below 0 degrees C.

Environment: Do not apply within 15 m of fish-bearing waters and wildlife habitats.

Tank Cleaning:

When spraying is completed, thoroughly rinse tank with clean water. Using a pressure washer and adding a detergent or Agral 90 or Agsurf to the rinse water will enhance removal of residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:

Caution Poison

Experimental studies have shown that the active ingredients in this product may cause birth defects in laboratory animals. Women capable of bearing children should avoid contact with this product.

Special Weed Problems

This section identifies specific weeds and some herbicides recommended for control. Refer to the particular crop section or the product label for information on specific products that may be used on the crops and for application instructions.

Absinthe

2,4-D LV Ester (500 g/L) - In grass pastures with no legumes, spray 1.82 L/acre in late June, prior to flowering. Re-treat regrowth in late summer when plants have 6 to 10 inches (15 to 25 cm) of new growth. More than 1 season of treatment may be required.

DyCleer - In grass pasture and rangeland only, apply 0.5 L/acre in 20 to 30 gallons (90 to 135 L) per acre for top-growth control when leaves are fully expanded.

Alders

2,4-D LV Ester (500 g/L) - In grass pastures and non-crop land, apply 1.78 L/acre to the foliage of actively growing brush.

Banvel II + 2,4-D amine or LV ester (500 g/L) - In grass pastures, rangeland and non-crop land, apply Banvel II at 2.1 L per 1,000 L of water with 2,4-D LV ester or amine at 4.0 L per 1,000 L of water to the foliage of actively growing brush in the spring or early summer and wet the foliage until the point of runoff.

Aspen Poplar (Trembling Aspen)

Banvel II + 2,4-D amine or LV ester (500 g/L) - In grass pastures, rangeland and non-crop land, apply Banvel II at 1.32 L/acre with 2,4-D LV ester or amine at 1.78 L/acre in 20 gallons/acre (90 L/acre) water to the foliage of actively growing brush in spring or early summer.

Remedy EC - In grass pasture and rangeland apply 1.62 to 3.24 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details.

Baby's Breath (Perennial)

Banvel II - In grass pastures with no legumes, apply 3.72 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water when actively growing.

DyCleer - In grass pasture and rangeland only, apply 3.72 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Biennial Wormwood

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing plants.

Black Medic

Buctril M/Dichlorprop +2,4-D/Mecoprop/Target/2,4-D amine or LV ester - Apply in registered crops at registered rates to black medic in the 1 to 4 leaf stage for suppression only.

Chokecherry

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing brush.

Remedy EC - In grass pasture and rangeland apply 1.62 to 3.24 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details. May need the higher rates for control and retreatment the following year.

Common Tansy

Glyphosate - Apply at 1.9-2.8 L/acre in 10 gallons of water/acre (40 L/acre) to actively growing plants that are 8-10 inches (20-25 cm) tall (summerfallow, stubble and non-cropland).

Escort - In pastures, rangeland and rough turf, apply 8 g/acre in 10 to 20 gallons/acre (45 to 90 L/ acre) of water to actively growing plants of less than 4 inches (10 cm) tall. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Curled Dock

Banvel II - As a patch treatment, apply 0.92 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds for top growth control.

Glyphosate - As a spot treatment, apply 2.83 to 4.86 L/acre in 10 gallons/acre (45 L/acre) water when most plants have reached the early bud stage. Do not disturb treated plants for at least 10 days following treatment.

MCPA amine, 2,4-D amine - Apply 0.445 to 0.69 L/acre of formulations containing 500 g/L MCPA or 2,4-D amine to give top growth control.

Dichlorprop + 2,4-D - 0.71 L/acre for suppression before plants are 2 inches (5 cm) tall.

Remedy EC - In grass pasture and rangeland apply 0.4 to 1.62 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Backpack method is also available - See Remedy section for details.

DyCleer - In grass pasture and rangeland only, apply 0.93 L/acre in 20 to 30 gallons (90 to 135 L) per acre for top-growth control when leaves are fully expanded.

Diffuse Knapweed

Banvel II - In grass pastures, rangeland and non-crop land, apply Banvel II at 1.86 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds.

Tordon 22K - In rangeland and grass pasture, apply 0.91 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

DyCleer - In grass pasture and rangeland only, apply 1.86 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Downy Brome and Japanese Brome

Glyphosate - Prior to crop emergence, apply 0.51 to 0.77 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water before downy brome is 6 inches (15 cm) in height.

Rustler - Prior to crop emergence, apply 1.0 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water between emergence and heading of downy brome.

Trifluralin - Apply at recommended rates for weed control in broadleaf crops prior to emergence.

Field Bindweed

Banvel II - As a patch treatment, apply 1.0 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water. Apply when field bindweed is in the flowering stage and allow 3 weeks after treatment before resuming normal summerfallow tillage.

Basagran - In labelled crops, apply 0.71 L/acre followed by 0.71 L/acre 7 to 10 days later. Apply in 20 to 35 gallons/acre (90 to 160 L/acre) water before field bindweed has developed a dark green colour and before it has begun trailing. Use a recommended surfactant (see recommendations under the appropriate crop).

2,4-DB - As a spot treatment in labelled crops apply 2.83 to 4.86 L/acre in 10 gallons/acre (45 L/acre) water at the bud stage. Do not disturb plants for at least 10 days following treatment. Heavy rainfall within 2 hours of application may wash chemical off the foliage and a repeat treatment may be required. Rainfall occurring within 6 hours after application may reduce control.

2,4-D amine - In grass pastures containing no legumes or as a spot treatment, apply 1.82 L/acre of formulations containing 500 g/L 2,4-D amine at early flowering stage.

Glyphosate - As a spot treatment, apply 2.8 to 4.9 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) at the full bloom stage or beyond. Allow 7 or more days after application before tillage.

Tordon 22K - In rangeland and grass pasture, apply 3.6 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Remedy EC - In grass pasture and rangeland apply 0.4 to 1.62 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Backpack method is also available - See Remedy section for details.

DyCleer - In grass pasture and rangeland only, apply 0.93 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Field Horsetail

MCPA amine, potassium and sodium salt mixtures - Apply 0.57 L/acre of formulations containing 500 g/L MCPA after the weeds have fully emerged for top growth control. May be used in wheat, oats, barley, flax and rye.

Amitrol 240 - Apply 5.0 to 6.7 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures when the weed is young and actively growing.

Foxtail Barley

Gramoxone - Apply 2.23 L/acre in 98 gallons/acre (445 L/acre) water or 75 mL in 2.2 gallons (10 L) water/1076 square feet (100 sq. m) for top growth control only.

Kerb 50-W - Apply 0.364 to 0.445 kg/acre product in 20 gallons/acre (90 L/acre) water between October 1 and freeze-up. Use the lower rate on grey-wooded soils or where perennial bluegrass or fescues are the predominant pasture species. Do not use Kerb for foxtail barley removal in seed grass stands or desired foliage stands of timothy or fescue grass species. At recommended rates, pasture stands of perennial bluegrass and fescue may be reduced by 10 to 15 percent. Where perennial bluegrass and fescues are the dominant pasture species, use the lower rate of Kerb. Spray overlaps may seriously harm desirable pasture grass species. Where the grass stand comprises mostly foxtail barley and reseeding to a desirable grass species is required, delay seeding into the Kerb-treated soil until the end of June. Do not harvest or graze within 60 days of application with Kerb. Avoid using Kerb on soils having more than 6 percent organic matter.

Glyphosate - Prior to crop emergence, apply 1 to 2 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water to foxtail barley at the seedling to heading stage. Late fall applications may provide better control of established plants than spring applications.

Roundup Transorb - In Roundup ready canola, apply 2 applications, each at 0.5 L/acre, for season long control.

Rustler - Prior to crop emergence, apply 1.26 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water to foxtail barley before initiation of the seed head for suppression only.

Sundance - Apply at 11 g/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water prior to flowering.

Goat's-Beard

2,4-D amine - Apply 0.91 L/acre of formulations containing 500 g/L in early fall or early spring.

Dichlorprop + 2,4-D - Apply 1.62 L/acre in early spring or fall.

DyCleer - In grass pasture and rangeland only, apply 1.86 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Gumweed

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 0.89 L/acre to the foliage of actively growing plants.

Hemp Dogbane

Glyphosate - Apply 2.83 to 4.86 L/acre when hemp dogbane is in the early bud stage. Apply in 10 gallons/acre (45 L/acre) water. Do not disturb treated plants for at least 7 days after application.

2,4-D amine or LV ester - Apply 1.38 to 1.82 L/acre of formulations containing 500 g/L 2,4-D in fall before frost and while plant leaves are green.

Hoary Cress

Amitrol 240 - For non-selective patch treatment in pastures and non-crop land, apply 8.9 to 13.8 L/acre.

Glyphosate - As a spot treatment in labelled crops, apply 2.83 to 4.86 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water when most plants have reached the early bud stage. Do not disturb treated plants for at least 10 days following treatment.

Leafy Spurge

Amitrol 240 - Apply 15.2 to 18.5 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures when the weed is between the late stages of flowering and early seed development.

Banvel II - Apply 0.84 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water for top growth control when the weed is actively growing.

2,4-D amine - Apply 1.82 L/acre of formulations containing 500 g/L 2,4-D at early flowering stage. Repeat at least once to new growth later in the season. Control of established plants and new seedlings will require continued applications for a period of at least 4 to 5 years.

Tordon 22K - In rangeland and grass pasture, apply 3.6 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

DyCleer - In grass pasture and rangeland only, apply 0.5 L/acre in 20 to 30 gallons (90 to 135 L) per acre for top-growth control when leaves are fully expanded.

Locoweeds, Lupines, and Milk-vetches

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 to 2.75 L/acre at the full bloom stage.

Remedy EC - To control vetches in grass pasture and rangeland apply 0.4 to 1.62 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Backpack method is also available - See Remedy section for details.

Milkweed

Amitrol 240 - Apply 7.6 to 11.3 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures in the early summer when all the shoots have emerged.

Glyphosate - When making preharvest applications, use 1.0 L/acre. For patch treatments, apply 4.86 L/acre in 10 gallons/acre (45 L/acre) water. Apply when most plants have reached the bud to bloom stage. Reduced results may occur on plants treated after full bloom as not all milkweed plants reach the required stage of growth at the same time. Repeat treatments may be required. Do not disturb plants for 10 days following treatment. Do not apply to plants covered with dust.

Narrow-leaf Hawk's-beard

2,4-DB - Apply to forage legume crops at recommended rates at the 2 to 4 leaf stage of narrow-leaf hawk's-beard, after legume growth in the fall has stopped.

2,4-D LV ester (500 g/L) - In fall stubble, apply 0.57 to 0.90 L/acre to fall rosettes.

Express Pack - In registered crops and summerfallow, apply at registered rates to spring seedlings less than 4 inches (10 cm) across or to fall rosettes.

Glyphosate - Prior to crop emergence, apply 0.51 to 0.77 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water. Use the high rate if narrow-leaf hawk's-beard is between 3 and 6 inches (8 to 15 cm) in height.

Roundup Transorb - In Roundup Ready canola, apply 0.5 L/acre at the 0 to 6 leaf stage.

Pasture Sage

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.2 L/acre to the foliage of actively growing plants.

Banvel II - In grass pastures, rangeland and non-crop land, apply Banvel II at 1.86 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds.

Tordon 22K - In rangeland and grass pasture, apply 1.82 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

DyCleer - In grass pasture and rangeland only, apply 1.86 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Perennial Smartweed

Glyphosate - Apply 2.0 L/acre in 10 gallons/acre water. Apply when vines are a minimum of 8 inches (20 cm) tall, but before flowering.

Poplar

Glyphosate - As a non-selective spot treatment, apply 1.21 to 2.43 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in the summer through early fall when brush is actively growing.

Remedy EC - In grass pasture and rangeland apply 1.62 to 3.24 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details.

DyCleer + 2,4-D - In grass pasture and rangeland only, apply DyCleer at 2.1 L plus 2,4-D 500 amine at 4 L or 2,4-D 600 ester at 3.3 L per 220 gallons (1000 L) of water and apply by wand to the point of runoff when leaves are fully expanded.

Poverty Weed

Banvel II - As a spot treatment apply 1.86 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water when weed is actively growing. Banvel II at 0.61 L/acre will provide only top growth control.

Tordon 22K - In rangeland and grass pasture, apply 1.82 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

DyCleer - In grass pasture and rangeland only, apply 1.86 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Prairie Everlasting, Prairie Sage

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing plants in the early fall, and repeat in the spring.

Purple Loosestrife

(dryland situations only)

Roundup Transorb - Apply 2.43 L/acre in 30 to 60 gallons/acre (135 to 270 L/acre) water when purple loosestrife is actively growing and at or beyond the bloom stage. If using hand held equipment, apply a 1 to 2 percent solution until plants are wet. Use a 33 percent product solution if using a wiper applicator. Do not treat plants over open water. If possible, remove and destroy the flower heads before treatment to ensure prevention of seed set. For large monocultures of purple loosestrife, gradually work from the periphery inward over a number of years to allow competing vegetation to invade the treated area. Sprayed areas should be monitored for new seedlings to prevent re-infestation of purple loosestrife.

Red Bartsia

2,4-D amine or LV ester - Apply 0.57 L/acre of formulations containing 500 g/L 2,4-D in 10 gallons/acre (45 L/acre) water. On hayland, treat within 10 days after first cutting. Roadsides and pastures should be sprayed as soon as the red bartsia appears, usually in early July. Repeat treatment if necessary for later germination.

Roses

Banvel II + 2,4-D amine or LV ester (500 g/L) - In grass pastures, rangeland and non-crop land, apply Banvel II at 1.48 L/acre with 2,4-D LV ester or amine at 1.78 L/acre to the foliage of actively growing brush in the spring or early summer.

Escort - In pasture and rangeland, apply Escort at 0.012 kg/acre with non - ionic surfactant at 0.2 L per 100 L spray solution in 10 to 20 gallons/acre (45 to 90 L/acre) water. Apply between mid-June and mid-August after the brush has leafed out, but before the leaves begin to turn their fall colours.

Remedy EC - In grass pasture and rangeland, apply 1.62 to 3.24 L/acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details.

DyCleer + 2,4-D - In grass pasture and rangeland only, apply DyCleer at 2.1 L plus 2,4-D 500 amine at 4 L or 2,4-D 600 ester at 3.3 L per 220 gallons (1000 L) of water and apply by wand to the point of runoff when leaves are fully expanded.

Russian Knapweed

Tordon 22K - In rangeland and grass pasture, apply 1.82 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

DyCleer - In grass pasture and rangeland only, apply 3.72 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Saskatoon

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing brush.

Scentless Chamomile

Ally plus 2,4-D - Apply 3 g/acre Ally plus 0.34 to 0.45 L/acre 2,4-D LV ester or amine (500 g/L formulations) in 10 gallons/acre (45 L/acre) water for control of scentless chamomile in wheat, barley, and creeping red fescue. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Banvel II - Apply 0.51 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds for top growth control.

Buctril M - Apply 0.405 L/acre Buctril M when scentless chamomile is in the 2 to 4 leaf stage.

Curtail M - In registered crops, apply 0.81 L/acre in 10 gallons/acre (45 L/acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

DyCleer - In grass pasture and rangeland only, apply 0.5 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Escort - In pastures, rangeland and rough turf, apply 8 g/acre in 10 to 20 gallons/acre (45 to 90 L / acre) of water to actively growing plants of less than 4 inches (10 cm) tall. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Liberty - In registered crops, apply 1.1 L/acre to plants up to 4 inches (10 cm) in height.

Lontrel - In registered crops, apply 0.23 L/acre in 10 gallons/acre (45 L/acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

Prevail - In registered crops, apply at a rate of 20 acres per case in 10 gallons/acre (45 L/acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

Refine Extra - Apply 8 g/acre in 10 gallons/acre (45 L/acre) water to actively growing seedlings for suppression. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Tordon 22K - In rangeland and grass pasture, apply 0.445 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Stinging Nettle

2,4-D amine - Apply 0.91 to 1.82 L/acre of formulations containing 500 g/L 2,4-D amine.

Stork's Bill

Linuron - Apply with MCPA amine in registered crops at registered rates to stork's-bill in the 2 to 4 leaf stage.

Ally Toss-N-Go - Apply with 2,4-D or MCPA amine or LV ester in registered crops at registered rates to stork's-bill in the 2 to 4 leaf stage.

Attain - Apply at a rate of 40 acres per case to registered crops when stork's-bill is in the 1 to 8 leaf stage.

Dichlorprop + 2,4-D - Apply at 0.71 L/acre to registered crops when stork's-bill is in the 2 to 4 leaf stage.

Liberty - in registered crops apply 1.35 L/acre to plants in 1 to 3 leaf stage.

Prestige - Apply at the rate of one case per 20 acres to registered crops when stork's-bill is in the 1 to 8 leaf stage.

Roundup Transorb - in Roundup Ready canola, apply 0.5 L/acre in the 0 to 6 leaf stage.

Toadflax

Ally plus 2,4-D - Apply 2 to 3 g/acre Ally plus 0.34 to 0.45 L/acre 2,4-D LV ester or amine (500 g/L formulations) in 10 gallons/acre (45 L/acre) water for toadflax suppression in wheat, barley, and creeping red fescue. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Amitrol 240 - Apply 7.6 to 11.3 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures when the weed is in the advanced rosette to prebud stage.

Dichlorprop + 2,4-D - Apply 0.71 L/acre in 10 to 18 gallons/acre (45 to 80 L/acre) water in wheat or barley for toadflax suppression. Apply when majority of toadflax is no taller than 6 inches (15 cm). The use of Dichlorprop + 2,4-D for suppression of toadflax in wheat or barley should be part of a long-term planned approach for toadflax control, which includes spring and fall tillage, fall patch spraying, summerfallow or chemical fallow.

Glyphosate - Apply 2.83 to 4.86 L/acre when most plants have reached the early bud stage of growth. Allow 7 more days after application before tillage. A rate of 1.0 L/acre may be used with preharvest applications or when controlling in summerfallow situations.

Tordon 22K - In rangeland and grass pasture, apply 3.6 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Refine Extra - In registered crops, apply 8 g/acre in 10 gallons/acre (45 L/acre) water for suppression of toadflax. Apply when toadflax is less than 15 cm (6 inches) in height. Add non-ionic surfactant at 0.2 L per 100 L spray solution.

Western Snowberry (Buckbrush)

Banvel II plus 2,4-D LV ester (500 g/L) - Apply 1.48 L/acre Banvel II tank mixed with 1.82 L/acre 2,4-D LV Ester in 20 gallons/acre (90 L/acre) water in spring or early summer after the leaves are fully expanded.

2,4-D amine or LV ester (500 g/L) - Apply 1.82 L/acre 2,4-D amine or LV ester in a minimum of 20 gallons/acre (90 L/acre) water in spring or early summer. Retreatment may be necessary the following year.

DyCleer + 2,4-D - In grass pasture and rangeland only, apply DyCleer at 2.1 L plus 2,4-D 500 amine at 4 L or 2,4-D 600 ester at 3.3 L per 220 gallons (1000 L) of water and apply by wand to the point of runoff when leaves are fully expanded.

Escort - Apply 10 g/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water between mid-June and mid-August after the brush has leafed out, but before the leaves turn their fall colours.

White Cockle

Mecoprop - Apply 2.2 L/acre in 18 gallons water/acre (*80 L/acre) for top growth control of established plants. Will also control seedlings. Apply to registered crops only.

2,4-DB - Apply Embutox 625 at 1.1 L/acre or Caliber 400 at 1.7 L/acre or Cobutox 600 at 1.1 L/acre for top growth control to registered crops only.

Wolf Willow (Silverwillow)

Banvel II + 2,4-D amine or LV ester (500 g/L) - In grass pastures with no legumes, apply Banvel II at 2.1 L per 1000 L of water with 2,4-D LV ester or amine at 4.0 L per 1000 L of water to the foliage of actively growing brush in the spring or early summer and wet the foliage until the point of runoff.

Wild Tomato

2,4-D or MCPA amine or ester (500 g/L) - Apply 0.34 to 0.45 L/acre to registered crops up to the 8 leaf stage of wild tomato.

Buctril M - Apply 0.40 L/acre to registered crops from the 1 to 6 leaf stage of wild tomato.

Willow

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing brush.

DyCleer + 2,4-D - In grass pasture and rangeland only, apply DyCleer at 1.7 L plus 2,4-D 500 amine at 3.24 L per acre in 20 to 30 gallons (90 to 135 L)of water per acre when leaves are fully expanded.

Glyphosate - As a non-selective spot treatment, apply 1.21 to 2.43 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in the summer through early fall when brush is actively growing.

Remedy EC - In grass pasture and rangeland apply 1.62 to 3.24 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details.

Soil Residual Herbicides

When applied at recommended rates in a crop, most herbicide residues will disappear within a few weeks after application and impose no restriction on cropping options the next year. However, some herbicide residues do not degrade quickly, and can persist in the soil for months or years following application, thereby restricting the crops that can be grown in rotation. Herbicide residues in the soil are deactivated in various ways including:

- Break down by chemical reactions,
- Break down by soil microbes,
- Escape to the atmosphere as a gas (volatilization),
- Break down by light (photodegradation),
- Leaching,
- Binding to soil particles.

Herbicides often disappear from the environment by more than one of these mechanisms. Many herbicides considered to be non-residual are bound temporarily to soil particles while they are broken down gradually by either soil microbes or chemical reactions. The binding action insures that the herbicide is not available to the crop in quantities that will cause damage.

As a general rule, breakdown processes are favoured by warm, moist soil conditions. During the winter, when the ground is frozen, and in the summer when the soil is dry, herbicide degradation is minimal. The residual activity of certain herbicides is also affected by soil organic matter and soil pH. These soil factors are seldom uniform across a field. Herbicide carryover, especially that of soil active herbicides, is aggravated by low levels of organic matter and is more likely to occur on eroded hilltops than in other parts of a field. Soil pH levels can vary significantly even within a field and pH can affect the speed of chemical reactions. The risk of herbicide carryover will also be greater in sprayer overlaps that are most common around headlands and slough margins.

Growers should be aware of the residual properties before applying any herbicide if they are to avoid cropping restrictions in following years. Knowledge of the limitations associated with herbicides that leave a soil residue, along with an accurate record of application (i.e. rates, locations) will serve to minimize rotational problems

Herbicides that leave a soil residue and are of particular concern in western Canada are:

2,4-D/MCPA - Phenoxy herbicides are lost from the soil primarily through biological degradation. This mode of breakdown is favoured by warm moist soil conditions. When applied at recommended rates in a crop 2,4-D or MCPA disappear within a few weeks after application and impose no restriction on recropping options the next year. However, 2,4-D or MCPA should not be applied in the spring either pre-emergence or prior to the seeding of a broad-leaf crop. Safe recropping intervals for broad-leaved crops cannot be given.

ACCENT - Accent residue in the soil is likely degraded through microbial activity. This mode of breakdown is favoured by warm moist soil conditions. Corn and spring cereals may be seeded the year following Accent application. For all other crops, a field bioassay* is recommended before planting.

ACCORD - Accord residue in the soil is broken down primarily through microbial degradation. This mode of breakdown is favoured by warm moist soil conditions. Wheat (including durum), barley, canola, field pea, and sunflower may be grown the year after treatment. Flax and lentil may be grown the second year after application on soil with high organic matter. In soil with low organic matter, flax and lentil crops should be delayed until the third year after application. Do not apply Accord on land where potatoes and vegetables are expected to be grown. Only spring wheat (including durum) may be reseeded in the same year of application. Perform a field bioassay* in the year before growing any crop not listed.

ADVANCE 10G (granular) - See Trifluralin

ALLY - Ally breaks down from treated soils through both chemical reaction and by microbial degradation. Breakdown is most rapid under conditions of moist soil, warm temperatures and low soil pH. Several crops including forage legumes, mustard, canola, flax, canaryseed, field pea and lentil are sensitive to Ally residues in the soil the year following application. Oat is somewhat sensitive at a soil pH of 7.0-7.9 on brown and dark brown soils. Use of Ally should be limited to soils with a pH of less than 7.9. Refer to the Ally section or product label for recropping details. Recropping intervals may be reduced if a successful field bioassay* has been completed.

AMBER - Amber residues in the soil break down by both chemical reaction and microbial degradation. Breakdown is most rapid under conditions of moist soil, warm temperatures and low soil pH. Crops such as canola, flax, canaryseed, field pea and lentil are highly sensitive to low levels of Amber residue in the soil. Refer to the Amber section or product label for recropping details. In soils with a pH greater than 7.5, crops other than wheat (including durum), barley and oat cannot be grown in rotation until a field bioassay* indicates that it is safe to do so. Hard Red Spring, Canada Prairie Spring, and Extra Strong wheat have no restrictions for reseeding at any pH level.

ANTHEM - See Sundance, page 211.

ASSERT 300-SC - Assert residues are broken down primarily by microbial degradation. This process is favoured by warm, moist soil conditions. Rotation to various crops the year following the application of Assert is dependent upon soil zone (Saskatchewan). In the black and grey wooded soil zones, wheat (spring, durum), barley, sunflower, flax, pea and canola can be seeded the year following application. In the brown and dark brown soil zones, wheat (spring, durum), barley and sunflower can be seeded the year following application. Wheat (spring, durum), barley, sunflower, flax, peas, canola, oat and canaryseed may be seeded in all soil zones 2 years after the application of Assert. To assess potential damage to crops not listed, conduct a field bioassay* in the year prior to growing the crop. Lentils are particularly sensitive to Assert residues in the soil. The additive effect of soil residues from the use of persistent sulfonylurea herbicides and Assert herbicide on the same land has not been determined. Crop rotation guidelines and minimum rotation intervals are not known and injury to rotational crops other than spring wheat (not including durum) may occur. Where Assert has been used on land previously treated with Accent, Ally, Amber, Muster, Prism, or Unity herbicides, plant only wheat (not including durum) until a field bioassay* demonstrates that other crops can be grown.

ATRAZINE - Atrazine is broken down in the soil through chemical reactions at low to normal pH. Microbial degradation is a minor contributor to atrazine breakdown. Both methods are maximized under warm, moist soil conditions. Breakdown is reduced at pH greater than 7.5 and under dry soil conditions. All crops except corn and triazine tolerant canola may be injured if seeded in the year of application. At annual weed rates (0.85-1.25 L/ac of 480 liquid or 0.44-0.69 kg/ac of water dispersible granules) the risk of injury is minimal to most rotational crops. Flax, pea, and fababean have some tolerance to atrazine residues and are usually not affected by residues from low rates applied the previous year. Very sensitive crops, such as oat, may be affected 2 or more years after application.

AVADEX BW (liquid and granular) - Avadex BW residue is lost from the soil primarily through microbial degradation. Volatilization is a secondary source of loss from the surface of the soil. Under normal conditions, Avadex BW will not leave a residue in the soil that would affect rotational crops. Under dry conditions, however, some Avadex BW may carryover. Therefore, oat should not be sown the year following application. Granular formulations may persist longer than liquid formulations.

ATTAIN - Fields previously treated with Attain can be seeded the following year to wheat, barley, oat, rye, forage grasses, peas, lentils, flax, canola, or mustard. Do not seed crops other than those listed above for at least 2 years following treatment.

BANVEL II - Banvel II is broken down primarily through microbial activity. At recommended rates of application in cereal crops (up to 0.117 L/acre), Banvel II will not leave a harmful residue in the soil. Banvel II used for perennial weed control in summer fallow and in stubble after harvest may result in residue carryover that will damage the following crop. Cereals, corn (field and sweet), soybeans, and white beans may be grown the year following a fallow application of up to 0.41 L/acre. These crops plus canola may be grown following a fallow application of up to 0.20 L/acre. An increased risk of crop injury may occur if a fallow application is made after September 1 or if soil moisture levels are extremely low following application.

BONANZA 400 or 10G (liquid or granular) - See Trifluralin

CURTAIL M - Soil residues of Curtail M are degraded primarily by microbial activity. Fields previously treated with Curtail M can be seeded to wheat, oat, barley, corn, rye, flax, canola, or mustard. Do not seed to crops other than those listed the year after treatment. There are no cropping restrictions thereafter. For updated information concerning the seeding of specialty crops call 1-800-667-3852.

EDGE - Edge residue in treated soil is broken down primarily by soil microbes during the growing season, but residues on the surface are also lost through volatilization and photodegradation. Microbial breakdown is favoured by warm, moist soil conditions, and carryover will be higher than expected under drought conditions. The risk of injury increases with conditions that reduce crop vigour, such as seedling disease, cold soil, deep seeding, high salt concentrations, soil compaction, water logged soils, drought, or low quality seed. Under typical conditions, Edge should not harm vigorous rotational crops if applied as directed. As a precaution very sensitive crops such as oat, canaryseed or small seeded grasses, such as timothy and creeping red fescue, should not be grown in rotation to an Edge treated crop. Wheat should also be avoided if the Edge application has been preceded by a high rate of trifluralin or another Edge treatment. Do not direct seed (zero till) a crop other than an oilseed or pulse crop into standing stubble following an application of Edge in the previous season. Granular formulations may persist longer than powder formulations.

EVEREST - Everest residue in the soil is degraded primarily through microbial activity in the soil. This process is optimum under warm moist soil conditions. In Brown soils seed only spring wheat the year after application. In Black, Dark Brown, or Grey-Wooded soils spring wheat, barley, canola, and field pea may be seeded.

FORTRESS - Fortress residue is broken down primarily by soil microbes during the growing season, but residues on the surface are also lost through volatilization and photodegradation. Microbial breakdown is favoured by warm, moist soil conditions, and carryover will be higher than expected under drought conditions. Under normal conditions, Fortress residues will not affect most crops the season after application. However, under dry conditions higher than normal levels of Fortress may exist. Therefore, oat, small seeded forage grasses and canaryseed should not be grown in rotation following a Fortress treated crop.

LONTREL - Lontrel residue is degraded exclusively by microbial action. Fields previously treated with Lontrel can be seeded to wheat, oat, barley, rye, forage grasses, flax, canola, or mustard. Do not seed to crops other than those listed the year after treatment. There are no cropping restrictions thereafter. For updated information concerning the seeding of specialty crops contact the manufacturer.

MUSTER - Muster residue in the soil is degraded primarily through microbial activity. Wheat, barley, oat, and flax may be seeded the year after application. Canola, lentils, field peas, fababeans, tame mustard, alfalfa, canaryseed, dry bean, fescue, and red clover may be grown in the second year after application.

ODYSSEY - Odyssey contains the same active ingredient as Pursuit (imazethapyr) in combination with another compound (imazamox) from the same chemical family. Both are lost primarily through microbial degradation, but the Pursuit active is the more persistent of the two compounds. Both compounds have the characteristic of extended carryover under acidic soil conditions. At recommended application rates less than 1/3 of the imazethapyr active is applied with Odyssey than with Pursuit. Under normal growing and soil conditions, spring wheat (including durum), lentils, alfalfa, Smart canola varieties and field peas can be grown in the year following an application of Odyssey. A field bioassay* should be conducted the year before growing any other crop. For current information contact the manufacturer.

POAST FLAXMAX - See Curtail M.

PREVAIL - See Curtail M.

PRISM - Prism residue in the soil is degraded primarily through microbial activity. This mode of breakdown is favoured by warm moist soil conditions. Crops that may be seeded one year after application of Prism are corn, potato, spring barley, canola, soybeans, white beans, red clover, and sorghum. A field bioassay* should be conducted the year before growing any other crop.

PURSUIT - The loss of Pursuit from soil is primarily through microbial degradation. This process is favoured under warm, moist conditions. Pursuit persists longer in acidic soil than normal pH soil. Breakdown stops under flooded conditions. Under normal growing and soil conditions, barley, spring wheat (not durum), lentils, alfalfa, Smart canola and field peas can be grown in the black and grey wooded soil zones the year following a Pursuit application. Other crops should not be grown in rotation until a field bioassay* indicates that it is safe to do so.

REMEDY EC - Remedy is degraded by both light (from plant surfaces) and soil microbial activity. Remedy is somewhat persistent in the soil and should only be applied to permanent range and pasture.

RIVAL (liquid and granular) - See Trifluralin.

SENCOR - Metibuzin is broken down in the soil primarily through microbial degradation. This process is maximized under warm, moist soil conditions. Breakdown is very rapid under flooded soil conditions. Pre-plant incorporated treatments at higher rates may carry over and affect sensitive crops the following year including canola, sunflowers and vegetable crops. Fall seeded crops may be injured in the same year as pre-plant or post-emergent applications.

SUNDANCE- Sulfosulfuron, the active ingredient in Sundance/Anthem, is broken down by microbial activity and chemical reactions. As a result, the cropping rotation restrictions for fields treated with Sundance or Anthem is determined by soil organic matter and pH. Fields with organic matter greater than 4 percent can be rotated to wheat (including durum), canola, barley, peas and flax while fields with less than 4 percent organic matter and a pH greater than 7.0 should be rotated to either wheat (including durum) or CLEARFIELD canola the year after treatment. Do not plant any other crops for at least 22 months after application. A field bioassay* must be conducted the year prior to growing the crop of interest to confirm crop safety.

TORDON 22K - Tordon 22K is degraded very slowly through microbial activity. Residues can persist for several years. Tordon 22K is also very soluble in water, making it prone to vertical and horizontal movement in soils, particularly in light soils. Do not apply Tordon 22K to permeable soils or near sensitive plants. For this reason Tordon 22K may only be applied to permanent grass pastures.

TREFLAN (liquid or granular) - See Trifluralin.

TRIFLURALIN (liquid or granular) - Trifluralin residue is broken down primarily by soil microbes during the growing season, but residues on the surface are also lost through volatilization and photodegradation. Microbial breakdown is favoured by warm, moist soil conditions, and carryover will be higher than expected under drought conditions. The risk of injury increases with conditions that reduce crop vigour, such as seedling disease, cold soil, deep seeding, high salt concentration, soil compaction, water logged soil, drought, or low-quality seed. Under typical conditions, trifluralin should not harm vigorous rotational crops if applied as directed. As a precaution very sensitive crops such as oat, canaryseed or small seeded grasses, such as timothy and creeping red fescue, should not be grown in rotation to a trifluralin treated crop. Wheat should also be avoided if the trifluralin application has been preceded by a high rate of trifluralin or Edge treatment. Do not direct seed (zero till) a crop other than an oilseed or pulse crop into standing stubble following an application of trifluralin in the previous season. To reduce the risk of wheat injury, avoid deep seeding, loose seedbeds, and seeding into cold ground. Barley is more tolerant to trifluralin residues than wheat. Do not plant oat, canaryseed or small seeded grasses for 24 months after a spring application or 30 months after a fall application of trifluralin. Do not plant fall rye for 6 months following a spring application or 12 months after a fall application. Carryover can be higher with granular formulations.

UNITY - (Brown and dark brown soils of Saskatchewan only) Unity residue breaks down by both chemical reaction and microbial degradation. Breakdown is most rapid under conditions of moist soil, warm temperatures and low soil pH. Crops other than wheat (spring, durum and CPS) are highly sensitive to low levels of Unity residue in the soil. Refer to the Unity section or product label for recropping details. In soils with a pH greater than 7.5, crops other than spring wheat (including durum), barley and oat cannot be grown in rotation until a successful bioassay* is performed. Hard Red Spring, Canada Prairie Spring, and Canada Extra Strong wheat have no restrictions for reseeding at any pH level. Refer to the Unity section or product label for recropping details.

*Note: A field bioassay means growing to maturity a test strip of the crop(s) intended for production the following year. A strip of the same crop grown in an untreated area nearby is helpful as a reference.

Effect of Rainfall on Herbicide Efficacy

Required Interval	Product
15 minutes	Reglone/Reglone Pro/Reglone 240
30 minutes	Horizon
1 hour	Achieve, Achieve Extra Gold, Assure II, Compas 480 EC, Gramoxone, Hoe-Grass, Hoe-Grass II, Horizon BTM, Poast Ultra, Puma^{120} Super, Puma Super, Select
2 hours	2,4-D LV Ester, Ally+2,4-D LV Ester, Atrazine (postemergent applications), Bladex Liquid (postemergent applications), Champion Plus, Fusilade II, Fusion, Laser DF, MCPA Ester, Triumph Plus, Venture
4 hours	Accent, Ally + 2,4-D Amine, Champion Extra, 2,4-D Amine, Harmony Total, Liberty, MCPA Amine, Muster, Muster Gold, Prism, Refine Extra, Stampede EDF
6 hours	Accord, Assert, Avenge, Curtail M, Express Pack, Flaxmax Ultra, MCPA-K, MCPA Sodium Salt, Prevail, Rustler, Sencor 75DF, Sencor 500
8 hours	Basagran, Laddock
No specific recommendation*	Amitrol 240, Attain, Banvel II, Buctril M, Caliber, Cobutox, Compitox, Dichlorprop-D, DyVel, DyVel DS, Embutox, Escort, Estaprop, Glyphosate, Gramoxone PDQ, Linuron, Lontrel, Mecoprop, Odyssey, Pardner, Pursuit, Target, Thumper, Tropotox Plus, Turboprop, Unity

* The products listed make no specific time recommendation on the label. The required rainfree period could be up to 8 hours. See the product page in the guide or consult the product label.

Note: The term "Rainfastness" refers to the time needed between application and rainfall to avoid significant reduction in efficacy. Rainfall shortly after application of most postemergent herbicides may reduce weed control. Effect will vary with product, the interval between spraying and rainfall and the intensity and duration of the rainfall. These guidelines are based on label information. Use the longest time interval on the component products when considering tank mixes.

Plant Disease Control

Integrated Plant Disease Management

Cereals

Cereal leaf diseases continue to hurt growers on two fronts: yield and quality. The fact sheet *Managing Cereal Leaf Diseases* outlines the best management practices to help growers manage cereal diseases and minimize the threat they pose to yield and quality. The following management practices are recommended for effective control of leaf diseases in all cereal crops, especially high-value barley and both spring and winter wheat.

Scouting: Scout fields at and following flag leaf emergence to check for disease levels. Healthy flag and upper leaves are critical, since more than 50% of grain filling is contributed by upper leaves.

Crop Rotation: Rotate crops (ie. wheat/oilseeds/barley/pulse) to reduce the build-up of disease inoculum in crop residue. If at all possible, do not follow wheat with wheat or barley with barley. When a short rotation is absolutely necessary, seed in the second year a variety that is more resistant to an anticipated disease problem.

Clean Seed: Use certified seed and/or seed that has been treated with an appropriate fungicide to reduce the possibility of introducing seed-borne inoculum into a field.

Seed Treatments: Seed treatments together with quality seed help emerging crops by controlling most seed-borne disease and allowing the crop to get a good start (quicker, more uniform plant emergence and better seedling vigour). Seed treatments protect young plants against seedling diseases but do not prevent later infection by cereal leaf diseases.

Resistant Varieties: Provincial crop/seed guides provide a comprehensive listing of the performance of adapted cultivars, including their resistance status to specific diseases.

Cropping Practices: Begin to scout fields prior to flag leaf emergence and continue to monitor crops for symptoms of leaf diseases appearing on the lower leaves.

Foliar Fungicides: Foliar fungicides applied at the proper time in accordance with manufacturer's recommendations can control cereal leaf diseases and help to attain target yields.

Spraying Practices: For maximum effectiveness, foliar fungicides should be applied preventively (when infection levels are extremely low). Good spray coverage with minimal drift is essential. Ideally, the best time to spray is when the wind is calm; humidity is above 60 percent; and air temperature is between 10 and 25 degrees C.

Fusarium Head Blight (FHB)

Fusarium head blight (FHB) of cereals causes a reduction in yield as a result of floret sterility and the loss of light weight kernels during combining. More important is the effect on grain quality and food safety. In Manitoba, FHB currently occurs throughout all crop regions and will damage wheat crops whenever environment conditions favour the disease. In Saskatchewan, FHB is established in the southeast but has occurred in some areas throughout the province.

For Fusarium head blight (FHB) to occur, three requirements must be met: the disease causing fungus must be present, a susceptible host grown, and environmental conditions favorable for infection and disease development. If any one of these factors is missing disease cannot occur, however, the severity of disease in the field is a result of the interaction of the above factors.

Field Management to Prevent Recurrence

Weather patterns are by far the greatest factor in the recurrence of FHB. The disease is most likely to develop when the plants are flowering, temperatures range from 25 to 30 degrees C and moisture is continuous for 48 to 60 hours. If conditions remain warm and moist, the pathogen can continue to sporulate and spread to other kernels or heads. Under these optimum conditions, crop management has little impact on FHB outbreaks.

Under average conditions, FHB can be effectively controlled through normal disease management practices. Like other plant diseases where the pathogen survives on cereal stubble, crop rotation is the most effective control tool.

Crop Rotation and Selection

A break of at least one year – preferably two years – is advised between cereal, grass and corn production.

Regardless of the rotation, producers should consider planting cereals that are less susceptible to FHB. Results from previous years show that durum wheat is more susceptible than hard red spring wheat varieties. Barley is more tolerant than wheat, and oats are considerably more tolerant than either wheat or barley.

Avoid planting the more susceptible types of wheat in high risk areas such as the southern part of the Red River Valley and southeastern Saskatchewan. Planting two or more varieties of wheat will spread out flowering times and reduce the risk of infection. Planting dates should be staggered within the recommended planting period to vary the flowering dates and reduce disease severity.

Susceptible crops should definitely not be planted on infected corn stubble. Corn trash is slower to decompose than cereal trash, and acts as a source of inoculum for a much longer time period. In fields of wheat on wheat stubble, the incidence was about one and a half times higher than in fields of wheat planted into pulse crop residue.

A forecast risk of occurrence of FHB in wheat during the growing season was conducted by Manitoba Agriculture and Food and the Agrometeorological Centre of Excellence with support from Bayer Inc. in 2000. This information appears on the Agrometeorological Centre of Excellence webpage http://www.gov.mb.ca/agriculture/news/ace/index.

Potatoes

One of the major threats to Manitoba's and Saskatchewan's potato industry is the fungal disease late blight. At present, there are no fungicides registered for use on potatoes that are capable of eradicating the fungus once it is present. As a result, producers are forced to adopt preventive management to control this disease. One of the main components of this strategy is the application of fungicides at specified spray intervals. This interval varies with the type of fungicide used. Shortening or lengthening of this interval should be based on current weather conditions and the status of the disease in the crop.

Manitoba Agriculture and Food, in association with the Agrometeorological Centre of Excellence; and Saskatchewan Agriculture and Food, in association with the Saskatchewan Seed Potato Growers Association, have initiated a weather monitoring program in the potato producing regions. The purpose of this program is to predict when environmental conditions are most conducive to disease development and issue warnings based on those predictions. Accurate weather monitoring and scouting techniques are very important for achieving the most effective use of fungicides. Combining precise weather monitoring with spray interval scheduling may lower input costs for the farmer and lead to a more productive, higher quality crop. These weather monitoring systems monitor key environmental variables, such as relative humidity, temperature, leaf wetness and precipitation. Risk forecast maps and interpretation appear on the Agrometeorological Centre of Excellence homepage http://www.gov.mb.ca/agriculture/news/ace/index in Manitoba and www.agr.gov.sk.ca in Saskatchewan.

The following management practices are recommended for effective control of late blight in potato crops.

Scouting: To effectively schedule preventative fungicide applications and eliminate unnecessary fungicide use, local weather forecasts should be used to identify conditions conducive to disease development. Scout fields to identify hot spots and other sources of disease when conditions are favourable.

Crop Varieties and Resistant Cultivars: Select varieties with resistance to late blight wherever possible. Where practical, the use of short season varieties may help reduce the period of use for fungicides.

Healthy Seed: Obtain seed from sources with effective disease management practices. The use of certified seed is recommended. Grade seed carefully while cutting and discard suspicious looking tubers and seed pieces.

Sanitation and Cull Clean-up: Follow a program of sanitation for storage facilities and equipment to eliminate sources of the disease. Avoid leaving tubers, including debris or slivers from seed cutting, in cull piles for any length of time. Avoid uncovered cull piles during the growing season.

Cultural Practices and Rotation: Use proper cultural practices including: rotate potato crops with non-late blight hosts; use proper hilling to reduce infection in tubers; increase spacings of plants to reduce canopy density; manage irrigation use to avoid increasing disease risk during prolonged periods of wetness; identify and destroy hot spots of infected fields; control weed hosts and remove and destroy volunteer potatoes.

Canola

For the past 25 years, sclerotinia stem rot has been one of the two prominent diseases affecting canola in Manitoba and Saskatchewan. An important factor of disease development is environmental conditions. The disease is much more widespread and severe during wet years.

Fungicide applications are an important element in controlling the development and spread of sclerotinia. Fungicide spray decisions are based on soil moisture, weather conditions, crop stage and density, and the history of disease in your area.

The sclerotinia fungal bodies require moist soil conditions for up to 10 days for germination to occur and the spore-bearing structures (apothecia) to form. Usually these conditions do not occur until the crop canopy closes. The spores released from the apothecia utilize the canola petals as a food source and fall into the canola canopy where they infect individual plants. Lesions form up and down the stem, wilting leaves and eventually killing the plant. Producers should check their fields prior to the flowering stage for the apothecia. Fungicide should be applied between the 20 to 50 per cent flower stage to protect the petals from being colonized by the spores.

A forecast of the risk of occurrence of sclerotinia of canola during the blossom period was conducted by Manitoba Agriculture and Food and the Agrometeorological Centre of Excellence with support from DuPont Canada Inc. and the Manitoba Canola Growers Association in 2000. Risk maps and interpretation for Manitoba and Eastern Saskatchewan are produced twice weekly from mid June through the end of July. This information appears on the Agrometeorological Centre of Excellence web page http://www.gov.mb.ca/agriculture/news/ace/index

Table 1. Foliar-applied Fungicides in Field Crops

FUNGICIDES	Page	Alfalfa (for seed only)	Barley	Beans (Field)	Canola	Lentils, Chickpeas	Oats	Peas (Field)	Potatoes*	Wheat	Anthracnose, Ascochyta (Lentils), Ascochyta (chickpea, peas)	Bacterial Blight (Beans)	Blackleg (Canola)	Botrytis/Gray Mould (Beans, Alfalfa)	Botrytis/Gray Mould (Potatoes)	Crown Rust (Oats)	Downy Mildew, Anthracnose (Beans)	Early Blight, Late Blight (Potatoes)	Leaf Rust, Stem Rust, Net Blotch, Scald (Barley)	Leaf Rust, Stem Rust (Wheat)	Powdery Mildew (Wheat, Barley, Peas)	Sclerotinia	Septoria (Wheat, Barley, Oats)	Tan Spot (Wheat)	Fusarium Head Blight (Wheat)	Alternaria Blackspot (Canola)
Acrobat MZ	249								X									●								
Benlate	254	X		X	X									●								●				
Bravo 500	255					X		X	X	X	●				●			●					●[2]	●	●[7]	
Clean Crop Copper Spray	258								X									●								
Clean Crop Copper 53W, Parasol	28			X					X			●					●[3]	●								
Curzate 60DF	261								X									●[6]								
Dithane DG Rainshield NT	264	X							X	X				●[9]				●		●[1]			●[2]	●		
Kocide 101, Kocide DF	258			X[8]					X			●[8]						●								
Kumulus DF	271							X													●[5]					
Manzate 200-DF	264								X	X								●		●[1]			●[2]	●		
Parasol	274			X					X			●						●								
Polyram 16D	275								X									●								
Polyram DF	275								X									●								
Quadris	278				X								●									●				●
Ridomil Gold/Bravo	280								X									●								
Ronilan EG	281			X	X									●[10]								●				
Rovral Flo	282				X																	●				●
Senator 70 WP	283			X																		●				
Tattoo C	285								X									●[6]								
Tilt 250 E	287		X		X		X			X			●			●			●	●	●[4]		●	●		

[1] leaf rust only
[2] wheat only
[3] Clean Crop Copper 53W only
[4] wheat, barley only
[5] peas only
[6] late blight only
[7] Suppression only
[8] Kocide 101 only
[9] alfalfa only
[10] beans only

*All products approved for use in potatoes by Midwest Foods Products Inc. and McCain Foods.

Table 2. Seed Treatments in Field Crops

		CROP DISEASES/INSECTS CONTROLLED																																	
		POTATO SEED PIECE						SEED AND SEEDLING ROTS/BLIGHTS														SMUTS CARRIED ON SEED							IN SEED		[illegible]	[illegible]	INSECTS		
FUNGICIDES	Page	Blackleg	Black Scurf (Rhizoctonia)	Common Scab	Seed Piece Decay	Storage Rot	Verticillium Wilt	Canola (Rapeseed)	Cereals	Chickpeas	Corn	Field Beans	Flax	Forage Legumes	Grasses	Lentils	Mustard	Peas	Soybeans	Sunflowers	Triticale	Barley - Covered	Barley - False Loose	Corn - Head Smut	Oats - Smut	Rye - Bunt	Rye - Stem Smut	Wheat - Bunt	Barley - Loose Smut	Wheat - Loose Smut	Canola (Rapeseed)	Canola (Rapeseed)	Wire Worms	Seed Corn Maggots	Flea Beetles
Agrox B-3, Agrox D-L Plus, DLC	250										●	●	/					●	●														●	●	
Apron FL	251							●	●	●	●	●		●	●			●	●	●5															
Baytan 30	253								●1,3													●	●					●	●	●					
Captan Flowable	256										●	●						●	●																
Charter	257								●																●			●	●	●					
Crown	260															●2																			
DB-Green L	262								●													●	●		●	●		●					●		
DCT	263											●4																							
Dividend XL RTA	266								●7																			●		●					
Foundation/Foundation Lite	268							●									●														●	●			●6
Mertect	272		●			●																													
N-M Drill Box	273								●				●									●	●		●	●		●							
N-M Dual Purpose	273								●													●	●		●	●		●					●		
Polyram 16D*	275			●	●																														
Raxil FL	279								●1																			●	●	●					
Senator PSPT*	283	●			●		●																												
Thiram 75WP	286										●	●			●		●	●	●																
Tuberseal*, Potato ST16*, Manco Plus*/Dithane F-45*	276				●																														
Vitaflo-280	291								●		●	●	●			●		●	●		●	●	●	●	●		●	●	●	●					
Vitavax Dual Powder	289								●				●									●	●		●		●	●	●	●			●		
Vitavax Dual Solution	289								●													●	●		●		●	●	●	●			●		
Vitaflo Dual Purpose	289								●3													●	●					●	●	●			●		
Vitavax Powder	291								●				●						●			●	●		●		●	●	●	●					
Vitavax rs Dynaseal, Vitavax rs Flowable, Cloak	293							●									●														●				●
Vitavax rs Fungicide	290							●																							●	●			
Vitavax Single Solution	294								●				●									●	●		●		●	●	●	●					

[1] also controls leaf stripe in barley and early season powdery mildew in wheat.

[2] also seed-borne ascochyta.

[3] wheat, barley only.

[4] also seed-borne anthracnose.

[5] also controls downy mildew.

[6] for Foundation only.

[7] wheat only, also supresses common root rot, Fusarium rot and take all.

*Products approved for use in potatoes by Midwest Food Products Inc. and McCain Foods.

Fungicide/Seed Treatment Directory

Acrobat MZ

Company:
BASF

Formulation:
9 percent dimethomorph and 60 percent mancozeb formulated as a wettable powder. Container size - 10 kg.

Crops:
Potatoes.

Diseases Controlled:
Early and late blight.

Reduction of tuber blight.

Crop Stage:
Make the first application when the disease threatens or when the first visible signs of disease occur in the field or nearby. Apply every 5 to 7 days under high disease pressure or every 7 to 10 days under low disease pressure. Do not apply more than 3 times per season. It is recommended to apply this product alternately with a fungicide having a different mode of action. Under high level of late blight infection, apply after top kill to control tuber blight.

How it Works:
Acrobat MZ has protectant, systemic and antisporulant activity. The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity. The active ingredient dimethomorph penetrates into the leaf tissue and moves within the leaf.

Cost:
$32.85/acre

(2000 suggested retail price).

Rate:
Apply at 1.0 kg per acre.

Water Volume:
Use sufficient water to obtain adequate spray coverage.

Ground - 18 gallons/acre (80 L/acre).

Aerial - minimum 5 gallons/acre (20 L/acre).

Restrictions:
Rainfall: Do not apply when rain is expected within 2 - 3 hours. Apply to dry foliage.

Preharvest Interval: 14 days.

Recropping: Do not replant in treated area within 120 days of last application.

Environmental: Do not apply to terrain where there is a potential for surface runoff to enter aquatic systems. This product is highly toxic to aquatic organisms. Do not apply within 100 m of streams, ponds, rivers and lakes when applying by air and within 50 m when applying by ground.

Storage: Store under cool, dry conditions in secure, well ventilated buildings away from food or feed.

[illegible] Plant diseases can develop resistance when exposed to one type of product or even products of similar chemistry. Use cultural practices and fungicide rotation as well as early preventive fungicide applications. Consult the government Potato Specialist or Plant Disease Specialist for disease outbreak forecast and recommendations.

Hazard Rating:
Caution: Potential skin sensitizer.

Agrox D-L Plus/Agrox B-3/DLC

Company:

Norac Concepts Inc. (Agrox D-L Plus, Agrox B-3), United Agri Products (DLC)

Formulation:

Agrox D-L Plus and DLC - 15 percent captan plus 15 percent diazinon plus 25 percent lindane. Formulated as a seed treatment powder.

Agrox B-3 - 33.5 percent captan, 11 percent diazinon, and 16.6 percent lindane.

Container size: Agrox D-L Plus - 0.2 kg, 0.6 kg, Agrox B-3 - 2.0 kg, DLC - 0.05 kg, 0.5 kg.

Crops:

Corn, beans, soybeans, peas.

Diseases Controlled:

Seedling blight and seed rot.

Insects Controlled:

Wireworms and seed corn maggots.

Crop Stage:

Seed treatment.

How it Works:

The active ingredient captan is a phthalimide fungicide with contact activity. The diazinon component is an organophosphate insecticide with contact and stomach activity. The lindane component is an organochlorine insecticide with contact and stomach activity.

Cost:

$30.98 for 600 g. Cost to treat 25 kg of seed - $2.58 (Agrox D-L Plus)

$85.98 for 2 kg. Cost to treat 25 kg of seed (dry application) - $3.44 (Agrox B-3)

$310.00 for 6 kg. Cost to treat 25 kg of seed - $2.84 (DLC)

(2000 suggested retail prices).

Rate:

Agrox D-L Plus - 0.05 kg per 25 kg of seed (one 0.6 kg container treats 300 kg, one 0.2 kg container treats 100 kg).

Agrox B-3 - Dry application: 0.08 kg (0.085 for corn) per 25 kg of seed. Slurry machines: adjust to apply 0.31 L (0.315 for corn) of slurry per 25 kg of seed and use 0.25 kg of seed treatment per L of water. Handmixing: 0.084 kg seed treatment per 0.5 L of water per 25 kg of seed..

DLC - One 0.5 kg tube treats 227 kg of seed, one 0.05 kg pouch treats 22.7 kg.

Water Volume:

See Rate.

Registered Mixes:

Do not use Agrox D-L Plus or DLC on seed already treated with an insecticide (other than methoxychlor or malathion).

Do not use Agrox B-3 on seed already treated with an insecticide.

Restrictions:

Use: Use Agrox D-L Plus or DLC only on seed previously treated with Captan or Thiram.

Storage: Store in a cool, dry place. Treated seed must be labelled. Label unplanted treated seed as follows: "POISONOUS TO MAN AND ANIMALS. This seed has been treated with Diazinon and Lindane for the control of insects, and Captan for disease control. Do not use for food or feed purposes. Do not sell to oil mills."

Precautions:

Do not mix with unprotected hands.

Hazard Rating:

Danger Poison

Apron FL

Company:

Gustafson

Formulation:

317 g/L metalaxyl formulated as a liquid seed treatment. Container size - 3.78 L.

Crops:

Alfalfa, beans, chickpeas, canola, clover, corn, grasses, low tannin lentils, peas, sainfoin, soybeans, sunflowers, and vetch. Crops for export only - wheat, barley, oats, rye, bird's-foot trefoil and sorghum.

Diseases Controlled:

Seed rots and seedling blights caused by *Pythium* spp. fungi, early season *Phytopthora* of soybeans, and downy mildew of sunflowers. Also (for export purposes only) downy mildew of peas, corn, and sorghum.

Crop Stage:

Seed treatment.

How it Works:

The active ingredient metalaxyl is an acylalanine fungicide with systemic activity.

Cost:

$181.06/L (2000 suggested retail price.)

Rates and Water Volumes:

Rates for crop processed in Canada:

CROP	APRON FL (L per 100 kg seed treated)	WATER (L required to make up a total volume of 0.5 L)	KG SEED TREATED PER JUG
Chickpeas*, dry peas*	0.016 - 0.11	0.484 - 0.39	23,625 - 3,436
Canola (rapeseed)*, processing peas	0.032 - 0.11	0.468 - 0.39	11,812 - 3,436
Sainfoin, vetch, alfalfa, beans, clover, corn	0.046 - 0.11	0.454 - 0.39	8,217 - 3,436
Grasses (forage), soybeans	0.046 - 0.093	0.454 - 0.407	8,217 - 4,064
Grasses (turf)0.093	0.407	4,064	
Sunflowers (high rate is for downy mildew control)	0.11 - 0.189	0.39 - 0.311	3,436 - 2,000
Low tannin lentils	0.016	0.484	23,625

*low rate gives good Pythium protection for 2 to 3 weeks.

Rates for crop to be exported:

CROP	APRON FL (L per 100 kg seed treated)	WATER (L required to make up a total volume of 0.5 - 0.62 L)	KG SEED TREATED PER JUG
Corn (downy mildew)	0.189 - 0.62	0.311 - 0	2,000 - 609
Peas (downy mildew)	0.146	0.354	2,589
Sunflowers 0.62 (downy mildew)	0	609	
Cereals (Pythium)	0.046 - 0.11	0.454 - 0.39	8,217 - 3,436
Sorghum (Pythium and downy mildew)	0.093 - 0.11 (Pythium) 0.189 (downy mildew)	0.407 - 0.39 (Pythium) 0.311 (downy mildew)	4,064 - 3,436 (Pythium) 2,000 (downy mildew)
Bird's-foot trefoil	0.046 - 0.11	0.454 - 0.39	8,217 - 3,436

Registered Mixes:

Compatible on the seed with the following products:

Alfalfa, Peas	Thiram 75WP
Beans	Vitaflo 280
Canola, Rapeseed	Cloak, Vitavax RS, Vitavax RS Dynaseal
Low Tannin Lentil	Crown

Application:

Apron FL contains no colourant. An appropriate dye such as Pro-Ized Dye must be added to slurry before treating seed. When preparing the slurry the following procedure should be used: 1. Partially fill the mixing tank with water. 2. Add the required quantity of Apron FL onto the water surface. 3. Allow products to disperse and switch on agitation. 4. Top up with extra water to required volume and maintain agitation during use. 5. Add colourant last.

Restrictions:

Use: 1. Treated seed must not be used for food, feed or oil processing. 2. Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed. Ensure that treated seed is properly incorporated at planting. 3. Treated seed must be labelled as follows; **"This seed has been treated with Apron FL seed protectant which contains metalaxyl. Do not use for feed, food or oil processing."**

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting.

Storage: Do not store above 35°C or below 0°C. Store in original container, away from pesticides, food or feed. All bags containing seed for export must be labelled "For Export Only."

Comments:

Treatment of highly mechanically damaged, poor quality or low vigour seed may result in reduced germination and/or reduced seed and seedling vigour. If seed lot quality is unknown conduct a germination test on a small portion of seed before treatment.

Baytan 30

Company:

Gustafson

Formulation:

317 g/L triadimenol formulated as a liquid seed treatment. Container size - 3.78 L.

Crops:

Wheat, barley.

Diseases Controlled:

Wheat and Winter Wheat - loose smut, common bunt, powdery mildew (early season control), and suppression of take-all.

Barley - true loose smut, covered smut, false loose smut, leaf stripe, suppression of net blotch, scald and common root rot.

Crop Stage:

Seed treatment.

How it Works:

The active ingredient triadimenol is a triazole fungicide with systemic activity.

Cost:

$2.92/25 kg seed, low rate

(2000 suggested retail price)

Rates and Water Volumes:

0.05 L per 100 kg seed will control:
Barley - smuts, leaf stripe and suppression of common root rot and scald
Spring wheat - smuts, powdery mildew
Winter wheat - smuts

0.1 L per 100 kg of seed will control:
Barley - suppression of net blotch
Winter wheat - powdery mildew and suppression of take-all

BAYTAN 30 (L per 100 kg seed)	WATER REQUIRED (L)	SLURRY RATE (L)	KG SEED TREATED PER JUG
0.05	0.2 - 0.45	0.25 - 0.5	7,460
0.1	0 15 - 0.4	0.25 - 0.5	3,780

Registered Mix:

Baytan 30 can be applied on seed treated with Vitaflo 280.

Restrictions:

Storage: Do not store treated seed. Treated seed must be labelled **"This seed has been treated with Baytan 30 - contains triadimenol. Do not use for feed, food or oil processing."** Store product in original container only, away from other pesticides, fertilizer, food or feed. Keep container closed.

Grazing: Do not graze livestock on treated areas for 40 days after planting.

Comments:

Baytan 30 is a seed treatment available to commercial applicators only. Seed treated with this product will sometimes emerge at a slower rate than untreated seed. Avoid late planting of treated winter wheat. Germination and seed vigour may also be reduced under adverse environmental conditions such as cool, wet soil or seed planted greater than a 4 cm depth. Baytan 30 contains no colourant. An appropriate dye such as Pro-Ized Dye must be added before treating seed. No colourant is required if applying over seed treated with Vitaflo 280.

Benlate/Benlate Toss-N-Go

Company:

DuPont Canada Inc.

Formulation:

50 % benomyl formulated as a wettable powder.

Container sizes -
Benlate - 10 kg
Benlate Toss-N-Go - 10 kg (1 kg water soluble bag, 5 x 1 kg per pouch, 2 x 5 kg pouch per case).

Crops:

Canola, field beans, seed alfalfa.

Diseases Controlled:

Sclerotinia stem rot in canola.

Sclerotinia and Botrytis (grey mould) in field, dry (white) and snap common beans and alfalfa grown for seed.

Crop Stage:

Canola - Can be applied up to the 50 % bloom stage. Optimum protection is from 20 to 30 % bloom stage, which is before the first petals begin to fall and where there is maximum number of petals and buds that can be covered by the spray.

Beans - Apply between the stage when 50 % of all plants have one open flower and full bloom.

Alfalfa - Apply at early bloom through to full bloom. Do not make more than two applications per year.

How it Works:

The active ingredient benomyl is a benzimidazole fungicide with systemic, curative and contact activity.

Cost:

$15.90 to $21.15/acre for canola

$37.10 to $47.70/acre for beans

$31.80/acre for alfalfa (2000 suggested retail prices).

Rate:

Canola - 0.3 to 0.4 kg/acre (one 10 kg container treats 33 to 25 acres). Use the high rate for application after 30% bloom, or under severe prolonged disease conditions (i.e. heavy crop canopy, high humidity, and/or excessive moisture).

Beans - 0.7 to 0.9 kg/acre (one 10 kg container treats 14 to 11 acres).

Alfalfa - 0.6 kg/acre (one 10 kg container treats 17 acres).

Water Volume:

Beans, alfalfa - Ground - 10 to 20 gallons/acre (40 to 80 L/acre).
Air - 3 gallons/acre (14 L/acre).

Canola - Ground - minimum 7 to 9 gallons/acre (32 to 40 L/acre).
Air - minimum 3.6 gallons/acre (16 L/acre).

Nozzles:

Hollow cone or flat fan for ground and properly calibrated aerial equipment.

Effects of Weather:

Rainfast within 1 to 2 hours of application. Do not irrigate within 6 hours of application.

Registered Mixes:

Do not mix with alkaline pesticides such as basic copper sulphate. Do not tank mix or alternate with thiophanate products (Easout).

Restrictions:

Grazing: Do not graze or feed treated hay to livestock.

Preharvest Interval: 14 days.

Storage: Do not allow product to become wet during storage. Keep away from fires or sparks.

Hazard Rating:

None.

Bravo 500

Company:

Syngenta

Formulation:

500 g/L chlorothalonil formulated as a suspension.
Container sizes - 2 x 10 L case, 200 L drum.

Crops:

Wheat (all wheat including durum & winter wheat), potatoes, lentils, chickpeas and field peas.

Diseases Controlled:

Wheat - Tan Spot, Septoria Glume Blotch, Septoria Leaf Spot. Suppression of Fusarium Head Blight (Scab).

Potatoes - Early and late blight, Botrytis vine rot.

Lentils - Anthracnose and Ascochyta blight.

Chickpeas - Ascochyta blight

Peas - Ascochyta blight

Crop Stage:

Wheat - For control of Tan Spot and Septoria, begin application at flag leaf emergence and repeat 10 - 14 days later when ears are visible. A third application when ears are fully emerged may be necessary, if conditions favour disease spread. For suppression of Fusarium Head Blight apply Bravo at early flowering. For best results, this application must be made before flowering has started in the majority of tillers and before the beginning of weather favouring disease. Do not make more than 3 applications per season. Rates and number of applications will depend upon disease severity and weather conditions.

Potatoes - Begin application when plants are 6 to 8 inches (15 to 20 cm) high or when disease threatens. Repeat applications at 7 to 10-day intervals or as necessary to maintain disease control. Under severe disease conditions use the higher rates at 7-day intervals.

Lentils - One application, must occur at early flowering.

Two applications - first application before flowering when bud formation is evident. Second application must occur at early to mid-flowering, 10 to 14 days after the first application, but before rows close in to form a dense canopy.

Rates and number of applications will depend upon disease severity and weather conditions.

Chickpeas - Make first application at early flowering and remaining applications at 10-day intervals. Do not make more than 3 applications per season. Rate and number of applications will depend upon disease severity and weather conditions.

Peas - Begin application at early flowering and repeat 10 days later at early pod set or mid-flowering if necessary. Make a third application 10 - 14 days after the second application at pod fill or later flowering should conditions remain favourable for disease. Do not make more than 3 applications per season. Rates and the number of applications will depend upon disease severity and weather conditions.

How it Works:

The active ingredient chlorothalonil is a phthalimide fungicide with contact activity.

Cost:

$7.56 to $12.60/acre for wheat.
$6.05 to $12.60/acre for potatoes.
$10.08 to $20.06/acre for chickpeas.
$10.08 to $20.06/acre for lentils.
$10.08 to $15.12/acre for peas.
(2000 suggested retail prices).

Rate:

Wheat - 0.6 L to 1 L/acre for the control of Tan Spot and Septoria.

0.8 L to 1 L/acre for the suppression of Fusarium Head Blight.

Potatoes - 0.48 to 1 L/acre for control of late blight. 0.65 to 1 L/acre for control of early blight and botrytis stem rot.

Lentils - 0.8 to 1.6 L/acre.

Chickpeas - 1.2 to 1.6 L/acre for first application. 0.8 to 1.2 L/acre for subsequent applications.

Peas - 0.8 L to 1.2 L/acre for the control of Ascochyta blight.

Water Volume:

Volume will vary with amount of plant growth. Use sufficient water to obtain adequate spray coverage. Spray volume will usually range from 20 to 140 gallons/acre (90 to 640 L/acre) for dilute sprays and 4.4 to 8.8 gallons/acre (20 to 40 L/acre) for concentrate sprays.

Chickpeas - 20 gallons/acre (90 L/acre). Ground application only

Registered Mixes:

Do not combine with pesticides, surfactants or fertilizers unless prior use has shown the combination physically compatible and non-injurious under your conditions of use. On lentils, do not apply in combination with POAST herbicide and MERGE surfactant or within 48 hours of the application of POAST and MERGE.

Restrictions:

Grazing: Do not graze treated areas. Do not feed straw from treated crop to livestock.

Preharvest Interval: Potato - 1 day.
Lentils and chickpeas - 48 days.
Wheat - 30 days.
Peas - 32 days.

Recropping: None.

Application: On lentils do not make more than 2 applications in the same season. On chickpeas, wheat and peas, do not make more than 3 applications per season. Do not apply by air for chickpeas.

Environmental: Do not apply if weather conditions favour drift from area being treated. Do not contaminate lakes, streams or ponds. Allow a buffer zone of 15 m between area being treated and aquatic systems for ground applications and a buffer zone of 100 m for aerial application.

Re-entry: Do not re-enter treated area within 48 hours. If required, and at least 4 hours have passed since application, individuals may re-enter treated area for short-term tasks not involving hand labour. Long pants, long-sleeved shirt, and chemical resistant gloves must be worn.

Storage: Store in a cool, dry, ventilated place. Protect from excessive heat.

Hazard Rating:

Warning, causes severe eye damage.

Captan Flowable

Company:

Norac Concepts Inc.

Formulation:

30 percent captan formulated as a flowable seed treatment.
Container sizes - 20 L, 415 L, 1000 L.

Crops:

Corn, beans, peas, soybeans.

Diseases Controlled:

Storage rot, seed decay, root rot, damping off, seedling blight.

Crop Stage:

Prior to storage or as a seed treatment.

How it Works:

Captan is a phthalimide fungicide with protective activity.

Cost:

$0.96 per 25 kg of bean, pea or soybean seed.
$0.41 per 25 kg corn seed.
(2000 suggested retail prices).

Rates:

CROP	CAPTAN FLOWABLE (L per 25 kg seed)
Beans	0.07
Corn (field)	0.03* - 0.05
Peas	0.07
Soybeans	0.07

*At this rate product is to be applied only by a professional applicator using equipment which will assure complete and uniform coverage.

Restrictions:

Storage: Do not freeze. Product must be stored at ambient temperatures above 0°C and must not be stored with herbicides, feed, food or fertilizer. All treated seed should be labelled, **"Poisonous to man and animals. Do not use for food or feed. Do not sell to oil mills. This seed has been treated with Captan."**

Charter

Company:

Aventis CropScience

Formulation:

25 g/L triticonazole formulated as a liquid seed treatment

Container size – 10 L(containing 3.1 L Charter)

200 L (containing 66.7 L Charter)

Crops:

Wheat, barley and oats.

Diseases Controlled:

For the control of true loose smut in barley, loose smut and common bunt in wheat as well as loose smut and covered smut in oats.

Crop Stage:

Seed treatment.

How it Works:

The active ingredient triticonazole is a triazole fungicide that provides systemic broad spectrum protection against seed and soil-borne diseases.

Cost:

Wheat -	$1.50/bu
Barley -	$1.20/bu
Oats -	$0.85/bu

(2000 suggested retail price)

Rate:

Must dilute with water to provide adequate coverage of seed. Add 2 parts water (200 mL) to 1 part (100 mL) Charter and mix well. Apply diluted Charter solution to seed at a rate of 300 mL/100 kg of seed.

Application:

Seed should be well conditioned and cleaned before treating. Treated seed should not require drying after treatment. Uniform coverage is required for good disease control. To ensure adequate coverage, add Charter slowly in a calibrated treating equipment system. Thoroughly mix the recommended amount of Charter into the required amount of water for the treater and follow manufacturer's instructions.

Restrictions:

Storage: Store in the original container. Keep container closed. Store in an area that is out of reach of children and animals, away from food, feedstuffs, fertilizer and seed. Protect from frost and freezing.

Store treated seed under cool, dry conditions. Do not store treated seed for more than 18 months as it may decrease in germination at a faster rate than untreated seed. Treated seed stored for more than 6 months should be tested for germination before use.

Treated seed should be labelled **"This seed has been treated with Charter, do not use for food, feed or processing"**

[illegible] Charter contains a triazole fungicide. [illegible] loss of disease control may occur over time if Charter or other fungicides in the triazole group are used repeatedly or consecutively in successive years [illegible] due to the development of resistant strains of pathogens. Alternate use of Charter with fungicides [illegible] different mode of action in your disease control [illegible]

Environmental: Do not feed or otherwise expose wildlife or birds to treated seed. Ensure proper disposal of any surplus treated seed not intended for later planting. Do not contaminate domestic, irrigation water or natural bodies of water.

Precautions:

When handling Charter or treated seed wear chemical resistant gloves and coveralls. Avoid inhaling or breathing dust. Work in a well ventilated area or wear a dust filtering respirator in non-ventilated areas. Wash hands and exposed skin thoroughly after handling the concentrate and after application.

Hazard Rating:

Caution Poison.

Clean Crop Copper 53W/Clean Crop Copper Spray/Kocide 101/Kocide DF

Company:

United Agri Products, (Clean Crop Copper 53W, Clean Crop Copper Spray).

Griffin, distributed by United Agri Products (Kocide)

Formulation:

Clean Crop Copper 53 W - 53 percent tribasic copper sulphate formulated as a wettable powder.
Container size - 10 kg.

Clean Crop Copper Spray - 50 percent copper oxychloride formulated as a wettable powder.
Container size - 10 x 2 kg case.

Kocide 101 - 50 percent copper as copper hydroxide formulated as a wettable powder.
Container size - 5 kg.

Kocide DF - 40 percent copper as copper hydroxide formulated as a dry flowable.
Container size - 10 kg.

Crops:

Potatoes, beans.

Diseases Controlled:

PRODUCT	POTATO	BEAN
Clean Crop Copper 53W	Early and late blight	Anthracnose Downy Mildew Bacterial Blight
Clean Crop Copper spray	Early and late blight	
Kocide 101	Early and late blight	Bacterial blight (bacterial and halo)
Kocide DF	Early and late blight	

Crop Stage:

Potatoes - (Clean Crop Copper 53W, Clean Crop Copper Spray) - Apply when plants are 5 to 7 inches (12 to 18 cm) tall. Repeat at 7 to 10 day intervals.

(Kocide 101, DF) - Apply when plants are 6 inches (15 cm) tall. Apply combined with 0.7 to 0.9 kg of a mancozeb product per acre, at 7 to 10 day intervals. Kocide may be applied at the highest rate with a desiccant at vine kill or alone after vine kill, prior to harvest, to reduce the risk of late blight tuber infection.

Beans - First application when plants are 6 inches (15 cm) tall, as a protectant. Repeat every 7 to 14 days depending on local conditions.

How it Works:

The active ingredients tribasic copper sulphate, copper oxychloride and copper hydroxide are inorganic fungicides with contact activity.

Cost:

Clean Crop Copper 53W - $11.50/kg
Clean Crop Copper Spray - $12.20/kg
Kocide 101 - $11.23/kg
Kocide DF - $12.00/kg
(2000 suggested retail prices)

Rates:

Product	Potato (kg/acre)	Acres treated by 1 container	Beans (kg/acre)	Acres treated by 1 container
Clean Crop Copper 53W	2.2	4.5	2.2	4.5
Clean Crop Copper Spray	1.6	6.25		
Kocide 101	0.44 - 0.9 1.38 (vine kill)	11.4 - 5.5 3.7 (vine kill)	0.9 - 1.3	5.5 - 3.8
Kocide DF	0.44 - 0.69 1.38 (vine kill)	23 - 14.5 7.3 (vine kill)		

Water Volumes:

Kocide 101, DF - Enough to ensure thorough coverage. Check label.

Clean Crop Copper 53W and Copper Spray - 88 gallons/acre (400 L/acre).

Restrictions:

Storage: Store in cool, dry, ventilated area, away from feed or food. Keep away from heat, fire and sparks.

Preharvest Interval: 1 day.

Environmental: Do not apply or allow to drift onto streams or any body of water.

Hazard Rating:

Warning Poison (Copper 53W, Copper Spray)

Caution Poison (Kocide 101)

Danger Poison (Kocide DF)

Crown

Company:

Gustafson

Formulation:

92 g/L carbathiin and 58 g/L thiabendazole, formulated as a liquid seed treatment. Container size - 10 L.

Crops:

Lentils.

Diseases Controlled:

Seed-borne Ascochyta, seedling blights and seed rots caused by Botrytis, Fusarium and Rhizoctonia fungi.

Crop Stage:

Seed treatment.

How it Works:

The active ingredient carbathiin is a systemic fungicide and the active ingredient thiabendazole is a benzimidazole fungicide with systemic activity.

Cost:

$7.00/25 kg of seed
(2000 suggested retail price).

Rate:

0.15 L per 25 kg of seed.

Compatibility with Rhizobia:

Crown is compatible with rhizobia. Contains a sticker for peat rhizobia. DO NOT TANK MIX CROWN WITH RHIZOBIA. Crown and rhizobia can be applied simultaneously to seed through separate systems or applied sequentially.

Application:

Commercial Treaters and On-Farm Auger Treating: Crown is a ready to use formulation designed for commercial treaters and on-farm auger treating. Crown is added directly to the seed as it enters a mixing chamber or auger. It is important that the seed and chemical be mixed quickly and uniformly. See instructions supplied with the applicable treater system for information on proper application techniques. When a grain auger is used for treating, running the auger less than full is the key to adequate mixing. Augers used for handling treated seed should not be used to move seed for food, feed or oil processing.

Applications to Seed in a Hopper Box or Seed Drill: Partially fill the hopper box or seed drill with a pre-measured amount of seed. Apply the proper amount of Crown evenly over the surface of the seed using 150 mL of Crown per 25 kg of lentil seed. DO NOT pour in one area. Mix with a paddle until all seed is of a uniform red colour, indicating adequate coverage. DO NOT MIX WITH HANDS. Repeat this procedure until all the hopper box or seed drill is filled. Seed can be planted immediately after treatment without drying.

Restrictions:

Feeding: Do not graze or feed livestock on treated areas for 4 weeks after planting.

Use: Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed. Ensure treated seed is properly incorporated at planting. Treated seed must not be used for food or feed.

Storage: Do not store above 35°C or below 0°C or in direct sunlight. Store in original container only, away from other pesticides, fertilizers, food or feed. Treated seed must be labelled as follows: **"This seed has been treated with Crown seed protectant, which contains carbathiin and thiabendazole. Do not use for food, feed or oil processing."**

Curzate 60 DF

Company

DuPont Canada Inc.

Formulation:

60 percent cymoxanil formulated as a dry flowable.

Container size- 1.8 kg

Crops:

Potatoes

Diseases Controlled:

Late blight *(Phytophthora infestans)*

Crop Stage:

Use Curzate 60 DF only in a tankmix with Manzate 200 DF. Do not use Curzate 60 DF alone.

Initial applications should start when local conditions indicate that late blight is imminent. Make additional applications at 5-7 day intervals. Apply no more than 7 applications per crop.

How it Works:

The active ingredient cymoxanil is a highly active, locally systemic fungicide. It works at several levels of preventative, curative and inhibitive (against sporulation).

The active ingredient mancozeb in Manzate 200 DF is a dithiocarbamate fungicide with contact activity.

Cost:

$10.99/acre (2001 expected retail price)

Rate:

Apply Curzate 60 DF at 0.09 kg/acre

Plus

Manzate 200 DF at 0.65 kg/acre

Water Volume:

Utilize sufficient water to obtain thorough coverage: 20-100 gallons/acre (80-400 L / acre).

Restrictions:

Application: Do not apply by air.

Rainfall: Curzate is rainfast within 2 hours after application.

Re-entry: Do not re-enter treated area within 24hours.

Preharvest Interval: 8 days

Storage: Store product in original container in a secure, dry area away from food or feed. Protect against humid air and water. Not for use or storage in or around the home. Keep container tightly closed.

Environment: A buffer zone of 50 metres is required between the down-wind edge of the boom and sensitive aquatic habitats such as ponds, lakes, rivers, streams, and wetlands. Do not contaminate these habitats when cleaning and rinsing equipment or containers. Do not clean sprayer near well or water source or near desirable vegetation.

Hazard Rating:

Caution poison

DB-Green L

Company:

Agsco Inc., distributed by United Agri Products

Formulation:

323 g/L maneb plus 108 g/L lindane formulated as a liquid seed treatment.
Container size - 57 L.

Crops:

Wheat, barley, oats, rye.

Diseases Controlled:

WHEAT	BARLEY	OATS	RYE
Common bunt Root rot Seedling blight - including Fusarium	Covered smut False loose smut Root rot Seedling blight	Covered smut Root rot Seedling blight	Common bunt Root rot Seedling blight

Insects Controlled:

Wireworms.

Crop Stage:

Seed treatment.

How it Works:

The ingredient maneb is a dithiocarbamate fungicide with contact activity. The active ingredient lindane is an organochlorine insecticide with contact and stomach activity.

Cost:

$1.50/25 kg of seed for wheat
$1.91/25 kg of seed for barley
$2.66/25 kg of seed for oats
$1.25/25 kg of seed for rye
(2000 suggested retail prices).

Rate:

78 mL/25 kg of seed - wheat
99 mL/25 kg of seed - barley
138 mL/25 kg of seed - oats
65 mL/25 kg of seed - rye

Restrictions:

Storage: Store in a cool, dry area. If product becomes frozen, thaw and shake or agitate. If treated seed is stored, label container, **"This seed has been treated with Agsco DB Green L Seed Treatment. Do not use for food, feed or processing."** Excess treated seed should not be stored past planting time.

Environmental: Do not contaminate ponds, lakes or streams.

Hazard Rating:

Danger Poison

DCT

Company:

Norac Concepts Inc.

Formulation:

6 percent diazinon, 18 percent captan, and 14 percent thiophanate-methyl formulated as a seed treatment powder. Container size - 10 kg, 400 g.

Crops:

Field beans.

Diseases Controlled:

Seedling blight, root rot, seed-borne anthracnose. This product will not control anthracnose if seed is severely infected.

Insects Controlled:

Root maggots.

Crop Stage:

Seed treatment. For best results, seed should be planted within a week of treating.

How it Works:

The active ingredient captan is a phthalimide fungicide with protective activity. The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity. The diazinon component is an organophosphate insecticide with contact and stomach activity.

Cost:

$5.39 per 25 kg of seed

(2000 suggested retail price).

Rates:

For slurry machines - 0.52 kg per 1 L water. Use 1 L of slurry per 100 kg of seed.

For hand mixing - 0.13 kg per 0.35 L water. Use 0.35 L of slurry per 25 kg of seed.

Restrictions:

Storage: Do not store treated seed for more than one month. Treated seed should be coloured and labelled **"Poisonous to man and animals. This seed has been treated with Diazinon, Captan and thiophanate-methyl for control of insects and seed-borne diseases. Do not use for food or feed purposes."**

Hazard Rating:

Danger Poison

Dithane DG Rainshield NT/ Manzate 200-DF

Company:

Rohm and Haas (Dithane DG Rainshield NT)

DuPont Canada Inc. (Manzate 200-DF)

Formulations:

Manzate 200-DF - 75 % mancozeb formulated as a dry flowable powder. Container sizes - 20 kg, 2.5 kg.
Dithane DG Rainshield NT - 75 % mancozeb formulated as a dispersible granule. Container size - 20 kg.

Crops:

Potatoes

Wheat

Seed alfalfa (Dithane DG Rainshield NT only).

Diseases Controlled:

	DITHANE DG RAINSHIELD NT	MANZATE 200 DF
Wheat	Tanspot, leaf rust, Septoria leaf blotch	Tanspot, leaf rust, Septoria leaf blotch
Potatoes	Early and late blight	Early and late blight
Seed Alfalfa	Leaf spot and stem spot diseases	

Crop Stage:

Potatoes - Apply when plants are 4 to 6 inches (10 to 15 cm) high; repeat at 7 to 10-day intervals. Start with low rate and increase to maximum as foliage develops. The spray interval may be reduced to 5 - 6 days during periods of wet weather favoring late blight and/or vigorous crop growth.

Wheat - May be applied early (when crop is in the 3 leaf to tillering stage) and/or late (when head is fully emerged, but prior to flowering). Do not make more than 2 applications per season.

Seed Alfalfa - Apply first application prior to 50% bloom. Repeat 7-10 days after the first application and 10 days after the second application. Do not make more than 3 applications per season.

How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity.

Cost:

Dithane DG Rainshield NT - $3.60 to $7.20/acre.
Manzate 200-DF - Not available.

(2000 suggested retail prices).

Rates:

Potatoes - 0.45 to 0.90 kg/acre.

Wheat (early) - 0.45 kg/acre; wheat (late) - 0.9 kg/acre.

Alfalfa - 0.6 kg/acre.

Nozzles:

Dithane DG Rainshield NT - flat fan.

Water Volume:

Thorough, uniform coverage is essential for good disease control.

Manzate 200-DF - 17 to 100 gallons/acre (80 to 400 L/acre) by ground sprayer; 5 to 7 gallons/acre (20 to 32 L/acre) by air.

Dithane DG Rainshield NT - 10 gallons/acre (45 L/acre) by ground.

Use 4 gallons/acre (18 L/acre) by air.

Effects of Weather:

Dithane DG Rainshield NT - must be dry on plant leaf prior to rainfall; approximately 1 hour is required without rainfall at moderate temperatures and humidity.

Registered Mixes:

For Dithane DG Rainshield NT, add other co-applied fungicides, insecticides, growth regulators, micronutrients and spray adjuvants to the tank last. Do not let Dithane DG Rainshield settle out in unagitated spray tank.

Restrictions:

Grazing: Do not graze or feed treated straw or plant tops to livestock.

Preharvest: Potatoes - 1 day.

Wheat - 40 days.

Environmental: Do not apply if weather favours drift from areas treated. Do not apply to water or wetlands.

Storage: Store in cool, dry, well-ventilated place. Keep away from fire and sparks.

Hazard Rating:

Warning Poison - Manzate 200 DF

Dithane F-45

Company:

Rohm and Haas Canada Inc.

Formulation:

37 percent mancozeb formulated as a flowable.

Crop:

Seed potatoes in storage.

Diseases Controlled:

Fusarium dry rot.

Crop Stage:

Storage treatment for harvested tubers to be used for seed. Thorough uniform coverage is essential for good disease control.

Rate:

1.58 L/1000 kg seed potatoes.

Water Volume:

Apply in 4 to 8 L of water as a spray on conveyor belt prior to storage.

Cost:

$7.00/L (2000 suggested retail price)

How it Works:

Mancozeb is a dithiocarbamate fungicide with contact activity.

Restrictions:

Storage: Do not allow product to freeze. Keep away from fire and sparks. Store in a cool dry well-ventilated place away from feed or food.

Environmental: Do not apply to water or wetlands. Do not contaminate water by cleaning of equipment or disposal of wastes.

Dividend XL RTA

Company:

Syngenta

Formulation:

3.21 % difenoconazole, 0.27 % metalaxyl-M formulated as a flowable seed treatment. The formulation contains a colouring agent which will colour the treated seed. Container size - 2 x 10 L jugs, 115 L returnable tote.

Crops:

Spring Wheat, Durum, Winter Wheat.

Diseases Controlled:

Dividend XL RTA is a ready-to-use systemic seed dressing which controls or suppresses certain seed- and soil-borne diseases of wheat.

Crop Stage:

Seed treatment.

Cost:

$2.05-$4.10/bu (2000 suggested retail price)

Rates and Diseases Controlled:

Crop	Rate/ 100 kg seed	Diseases Controlled	Diseases Suppressed[2]	Early Season Foliar Diseases Controlled[1]
Winter Wheat	650 mL	Common Bunt[3], Dwarf Bunt, Loose Smut, Seed-Borne *Septoria*, seed-borne and soil-borne Fusarium, General Seed Rots[4], *Pythium* Damping Off	Common Root Rot (*Cochliobolus* spp.), Take All, Fusarium crown and root rot	*Septoria* Leaf Blotch
	325 mL	Common Bunt[3], Dwarf Bunt, Loose Smut, seed-borne and soil-borne Fusarium, General Seed Rots[4], *Pythium* Damping Off	Common Root Rot (*Cochliobolus* spp.), Take All, Fusarium crown and root rot	
Spring Wheat	650 mL	Common Bunt[3], Loose Smut, Seed-Borne *Septoria*, Seed-Borne and soil borne *Fusarium*, General Seed Rots[4], *Pythium* Damping Off	Common Root Rot (*Cochliobolus* spp.), Take All, Fusarium crown and root rot	
	325 mL	Common Bunt[3], Loose Smut, seed-borne and soil-borne Fusarium, General Seed Rots[4], *Pythium* Damping Off	Common Root Rot (*Cochliobolus* spp.), Take All, Fusarium crown and root rot	

[1] Dividend XL RTA provides control of early season *Septoria* leaf blotch in winter wheat for the first six (6) weeks after planting. For full season control, apply a foliar fungicide according to label directions.

[2] Suppression means consistent control at a level which is not optimal but is still of commercial benefit.

[3] Dividend XL RTA controls both seed and soil-borne common bunt.

[4] General seed rots controlled include those caused by saprophytic organisms such as *Penicillium* and *Aspergillus*.

How it Works:

The active ingredient difenoconazole is a systemic fungicide from the triazole chemical class that provides broad spectrum protection against seed and soil-borne diseases. Metalaxyl-M is a phenylamide fungicide with systemic activity against diseases caused by the Oomycetes class, including Pythium damping-off.

Water Volume:

Dividend XL RTA (ready to apply) does not require addition of water for application. However, when using the Flexi-Coil Seed Treatment Unit, Dividend XL RTA must be diluted with water to reach 99 mL/10 kg of seed. The recommended dilution rate is 1 part Dividend XL RTA to 2 parts water. This is equal to 33 ml of Dividend plus 66 ml of water in order to achieve the total liquid volume requirement of 99 ml/10 kg seed.

Application:

Dividend XL RTA is a ready-to-apply formulation for use in commercial seed treatment plants, and for on-farm treatment using standard gravity flow or mist-type seed treatment equipment which accurately meters and mixes a flowable seed treatment. The equipment must provide uniform coverage of Dividend XL RTA on the seed. Uneven seed coverage may not give the desired level of disease control.

Consult the manufacturer of the application equipment for suitability for this application and for instructions on operation and calibration of the equipment.

Restrictions:

Environmental: Do not apply to water or wetlands. Do not contaminate water by cleaning of equipment or disposal of wastes.

Storage: Keep in heated storage. Product will freeze at -18°C.

Treated seed should be labelled "This seed has been treated with Dividend XL RTA; do NOT use for food or feed."

Precautions:

When handling Dividend XL RTA, contaminated equipment or seed treated with Dividend XL RTA, wear long pants, a long-sleeved shirt and chemical resistant gloves.

Hazard Rating:

None.

Foundation

Company:

Aventis CropScience

Formulation:

99 g/L of iprodione, 66 g/L of thiram and 495 g/L of lindane.

Container size - 100 L, 200 L, 1,000 L.

Crops:

Canola, mustard.

Diseases Controlled:

Damping off and root rot caused by *Rhizoctonia solani*, seed borne blackleg and seed-borne Alternaria black spot.

Insects Controlled:

Flea beetles.

Crop Stage:

Seed treatment. This treatment only provides early season control against seed-borne diseases.

How it Works:

The active ingredient thiram is a dithiocarbamate fungicide with contact activity. The active ingredient iprodione is a dicarboximide fungicide with contact and eradicant activity. The active ingredient lindane is an organochlorine insecticide with contact and stomach activity.

Cost:

$34.40/L (2000 suggested retail price).

Application:

Roll drum or stir well before using.

FOUNDATION treated seed should not require drying after treatment and can be stored or bagged immediately. Add to seed slowly and mix well for 3-5 minutes in treating equipment. Thorough seed coverage is required.

Rate:

30 mL/kg seed

750 mL treats 25 kg bag of seed.

100 L container treats 3,333 kg of seed

200 L container treats 6,666 kg of seed

1,000 L container treats 33,333 kg of seed

Registered Mixes:

Foundation treated seed can be mixed with the granular insecticide Furadan CR-10 and Counter 5G. Refer to labels of both products for use recommendations and all safety precautions.

Restrictions:

Storage: Protect product from frost. Store treated seed in cool, dry conditions. Do not store treated seed for more than 6 months. Treated seed stored for more than 6 months should be tested for germination. Treated seed must be labelled **"This seed has been treated with FOUNDATION containing iprodione, thiram and lindane. Do not use for feed, food or oil processing."**

Environmental: Do not contaminate domestic or irrigation waters.

Precautions:

Do not consume alcoholic beverages 24 hours before or after working with FOUNDATION or treated seed.

Hazard Rating:

Danger Poison

Foundation Lite

Company:

Aventis CropScience

Formulation:

132 g/L iprodione and 88 g/L thiram.

Container size - 100 L, 200 L, 1000 L.

Crop:

Canola, mustard.

Diseases Controlled:

Damping off and root rot caused by *Rhizoctonia solani*, seed-borne blackleg and seed-borne Alternaria black spot.

Crop Stage:

Seed treatment. This treatment only provides early season control against seed-borne diseases.

How it Works:

The active ingredient thiram is a dithiocarbamate fungicide with contact activity. The active ingredient iprodione is a dicarboximide fungicide with contact and eradicant activity.

Cost:

$30.54/L (2000 suggested retail price).

Rate:

22.5 mL/kg of seed. (563 mL/ 25 kg bag of seed.)

100 L container treats 4,444 kg of seed

200 L container treats 8,888 kg of seed

1,000 L container treats 44,444 kg of seed.

Application:

Roll drum or stir well before using.

FOUNDATION LITE treated seed should not require drying after treatment and can be stored or bagged immediately. Add to seed slowly and mix well for 3-5 minutes in treating equipment. Thorough seed coverage is required.

Registered Mixes:

Insecticides: Treated seed can be mixed with the granular insecticide Counter 5G. Refer to the Counter 5G label for recommendations and precautions.

Restrictions:

Storage: Protect product from frost. Store treated seed in cool dry conditions. Do not store treated seed for more than 6 months. Treated seed stored for periods in excess of 6 months may decrease in germination at a faster rate than untreated seed. Treated seed stored for more than 6 months should be tested for germination before planting. Treated seed must be labelled **"This seed has been treated with Foundation Lite containing iprodione and thiram. Do not use for feed, food or oil processing."** Date of treatment must also be included.

Environmental: Do not contaminate domestic or irrigation waters.

Precautions:

Do not consume alcoholic beverages 24 hours before or after working with FOUNDATION LITE.

Hazard Rating:

Caution Poison

General Storage Disinfectant

Company:

Ag Services Inc. distributed by Van Waters & Rogers

Formulation:

10 percent quarternary ammonia, formulated as a liquid. Container sizes - 4 L, 20 L.

Crops:

Potatoes (disinfectant for seed potato storage areas and equipment).

Disease Controlled:

Bacterial ring rot.

Cost:

$85.00/20 L (2000 suggested retail price).

Rate:

0.060 L/10 L of water.

Application:

To disinfect walls and floors of seed potato houses, begin by removing all dirt and debris with broom or vacuum. Wash, mop or spray thoroughly with solution. Allow all treated surfaces to remain wet for at least 20 minutes. The same strength solution can be used to disinfect used bags, potato planters and other machinery after all dirt has been removed. Soak bags for at least 1 hour. Avoid contact with food products.

Storage Walls and Ceilings - use 0.6 L of disinfectant in 100 L of water. Spray areas using a high pressure jet (up to 4,250 kPa pressure) to penetrate cracks etc. in floors, A-Frames and other storage air ducts with a solution of 1.2 L of disinfectant in 100 L of water.

Registered Mixes:

Do not mix with soaps or anionic detergents.

Hazard Rating:

Caution Corrosive

Kumulus DF

Company:
BASF

Formulation:
80% sulphur formulated as a water dispersible granular. Container size - 25 kg bag.

Crop:
Field peas.

Disease Controlled:
Powdery mildew.

Crop Stage:
Spray at first appearance of disease and repeat at 7 to 10 day intervals as necessary.

How it Works:
The active ingredient sulphur is an inorganic fungicide with contact activity.

Cost:
$2.01/acre (2000 suggested retail price).

Rate:
0.6 kg/acre (one bag treats 41 acres).

Water Volume:
Minimum of 10 gallons/acre (45 L/acre). Higher water volumes may be required later in the growing season. Use sufficient water volume to thoroughly cover all foliage.

Effects of Weather:
Do not apply when rain or night frost is expected. Do not apply if temperature is above 27°C (in shade) and high humidity prevails, or if any of the above conditions are expected within 3 days after treatment. Do not apply under intense sunshine. Do not apply when weather favours drift.

Registered Mixes:
Do not mix with dinitro compounds, tetradifon or oils.

Restrictions:
Preharvest: 1 day.

Storage: Keep away from heat, fire or sparks. Store in cool, dry, locked, well-ventilated area without floor drain.

Application: Do not apply by air. Avoid drift onto neighbouring crops.

Caution: Drift to off-target crops may cause leaf burn.

Mertect SC

Company:

Syngenta

Formulation:

500 g/L thiabendazole formulated as a water dispersible suspension. Container size - 4 L.

Crops:

Potato (tubers).

Diseases Controlled:

Fusarium dry rot
Skin spot
Silver scurf
Black scurf
Pocket rot.

Crop Stage:

Postharvest treatment.

How it Works:

The active ingredient thiabendazole is a benzimidazole fungicide with systemic activity.

Cost:

$71.64/L (2000 suggested retail price)

Rate:

7.5 L/37 gallons (170 L) of water.

2 L of the above solution treats 1 metric tonne (two containers treat 90 metric tonnes).

Water Volume:

See Rates.

Restrictions:

Storage: Minimum storage temperature 0°C.

Resistance: Thiabendazole-resistant strains of silver scurf and fusarium dry rot can develop.

Strains of some fungi may develop tolerance to Mertect SC or other products in the same class of chemistry after prolonged usage. When using Mertect SC, use full rates and ensure thorough coverage. If potatoes are going to be treated with Mertect SC prior to storage in the fall, do not use any product containing thiophanate-methyl at planting. Do not use any product containing thiophanate-methyl if Mertect SC was used as the storage treatment on seed. Use seed treatment with a different mode of action on Mertect SC treated seed potatoes.

Registered Mixes:

Before mixing with other chemicals, consult the manufacturer.

Comments:

Do not allow suspension to stand without continuous agitation.

Potatoes must rotate along conveyor line to ensure complete coverage.

Prior to treating potatoes destined for export, confirm with authorities that treated potatoes will be allowed to enter importing country.

N-M Drill Box/N-M Dual Purpose

Company:

Interprovincial Cooperative Ltd. (IPCO)

Crops:

Wheat, rye, oats, barley.
Flax (N-M Drill Box only).

Formulations:

N-M Drill Box - 50 percent maneb formulated as powder.
Container size - 1 kg.

N-M Dual Purpose - 37.5 percent maneb and 18.75 percent lindane formulated as powder.
Container size - 1 kg.

Diseases Controlled:

WHEAT	BARLEY	OATS	RYE	FLAX
Stinking smut (bunt) Seed-borne seedling blight Root rot	Covered smut False loose smut Seed-borne seedling blight Root rot	Loose smut Covered smut Seed-borne seedling blight Root rot	Bunt Seed-borne seedling blight	Seedling blight Damping off

Insects Controlled:

Wireworms - N-M Dual Purpose.

Crop Stage:

Seed treatment.

How it Works:

The active ingredient maneb is a dithiocarbamate fungicide with contact activity. The active ingredient lindane is an organochlorine insecticide with contact and stomach activity.

Cost:

Not available.

Rates:

CROP	N-M DRILL BOX		N-M DUAL	
	RATE/25 KG SEED	AMOUNT SEED TREATED/PKG	RATE/25 KG SEED	AMOUNT SEED TREATED/PKG
Wheat	26 - 40 g	625 - 961 kg	52 g	480 kg
Barley	50 - 66 g	378 - 500 kg	65 g	384 kg
Oats	69 - 92 g	272 - 362 kg	92 g	271 kg
Rye	28 - 43 g	581 - 892 kg	56 g	445 kg
Flax	112 g	223 kg		

Water Volumes:

Not applicable.

Tank Mixes:

Not applicable.

Restrictions:

Storage: Store in a dry, ventilated place. Avoid overheating. Keep away from fire or spark. Do not store treated seed for more than 1 year.

Do not use treated seed in feed or foodstuffs. If treated seed must be stored, label as follows: "Poisonous to man and animals. This seed has been treated with IPCO N-M Drill Box containing maneb for the control of seed-borne diseases." or "Poisonous to man and animals. This seed has been treated with IPCO N-M Dual Purpose Drill Box containing lindane and maneb for the control of wireworms and seed-borne diseases. Do not use for food or feed." At the end of seeding, clean drill thoroughly and bury any dust or seed remaining.

Hazard Rating:

Warning Poison

Parasol

Company:

Agtrol International, distributed by Van Waters and Rogers Ltd.

Formulations:

50 % copper equivalent as copper hydroxide formulated as a wettable powder. Container size - 10 kg.

Crops:

Beans, potatoes.

Diseases Controlled:

Beans - Bacterial blight (common and halo)

Potatoes - early and late blight

Crop Stage:

Beans - Apply first applicatio[illegible]hen plants are 15 cm (6 inches) high. Continue ap[illegible]n every 7 to 14 days depending on weather condi[illegible]nd disease pressure.

Potatoes - Apply Parasol in combination with mancozeb (80 %) every 7 to 10 days starting when plants are 15 cm (6 inches) high until harvest. Apply Parasol either with a desiccant at vine kill or alone after vine kill but prior to harvest to reduce late blight tuber infections at harvest.

How it Works:

The active ingredient copper hydroxide is an inorganic fungicide/bactericide with contact activity.

Cost:

Not available.

Rate:

Beans - 0.9 to 1.3 kg/acre.

Potatoes - 0.44 to 1.0 kg/acre with mancozeb (80 percent) at 0.7 to 0.9 kg/acre.

Restrictions:

Preharvest Interval: 1 day.

Environmental: Do not contaminate any body of water.

Storage: Store in a cool, dry and well-ventilated area in original container.

Hazard Rating:

Caution Poison

Polyram DF/Polyram 16D

Company:

BASF

Formulation:

Polyram 16 Dust - 16 % metiram formulated as dust.
Container size - 10 kg.

Polyram DF - contains 80 % metiram formulated as dry flowable.
Container size - 20 kg.

Crops:

Potatoes.

Diseases Controlled:

Polyram DF	Early blight Late blight
Polyram 16D	Early blight Late blight Seed Treatments: Fusarium seed piece decay Seed-borne common scab

Crop Stage:

Potatoes: Polyram DF - Use lowest rates at 7 to 10 day intervals until plants cover the row then use highest rates until top kill; or use lowest rates at 5 to 7 day intervals beginning when plants are 6 inches (15 cm) high and continue until top kill.

Polyram 16D - Begin applications when plants are 6 inches (15 cm) high at 7 to 10-day intervals until top kill. Use lower rate for younger plants.

Potato Seed: Polyram 16D. Plant seed as soon as possible after treating.

How it Works:

The active ingredient metiram is a dithiocarbamate fungicide with contact activity.

Cost:

Polyram 16D - $21.93 - $25.59/acre

Polyram 16D seed treatment - $2.06 - $2.97/100 kg seed

Polyram DF - $3.63 - $7.43/acre

Registered Mixes:

Polyram DF - Do not mix with liquid fertilizers, Bordeaux mixture or hydrated lime. Mixtures with diazinon or malathion should be prepared immediately prior to use and not allowed to stand in the tank.

Rates:

CROP	FORMULATION	RATE	AMOUNT OR AREA ONE PACKAGE TREATS
Potato	Polyram DF Polyram 16D	0.44 - 0.90 kg/acre 4.8 - 5.6 kg/acre	45 - 22 acres 2.0 - 1.8 acres
Potato seed piece	Polyram 16D	0.45 - 0.65 kg/100 kg seed	2,200 - 1,538 kg

Water Volumes:

For Polyram DF:

Ground - 8.8 to 17.6 gallons/acre (40 to 80 L/acre);

Aircraft - 4.8 gallons/acre (22 L/acre).

Nozzles:

Hollow cones or flat fans recommended.

Effects of Weather:

Polyram 16D & DF - When weather conditions favour disease development the shorter spray intervals may be required.

Polyram 16D - Treated potato seed should not be allowed to stand in hot sun or drying wind. Seed should not be planted into hot, dry soil or in cold, wet soil.

Restrictions:

Grazing: Do not use treated crop parts for feed or food.

Preharvest Interval: May be applied up to the day before harvest.

Recropping: None.

Storage: Store in a cool, dry place away from flame or sparks. If product becomes wet or overheated, effectiveness is reduced and flammable vapours may be produced. Do not freeze.

Environmental: Do not apply when environmental conditions favour drift from treated area. Do not contaminate domestic or irrigation water, lakes, streams or ponds by the cleaning of equipment or otherwise.

Potato ST 16/MancoPlus/Tuberseal

Company:

Norac Concepts Inc. (MancoPlus, Tuberseal)

United Agri Products (Potato ST 16)

Formulations:

MancoPlus, Tuberseal Potato Seed Piece Dust - 16 % mancozeb formulated as a dust. Container size - 10 kg.

Potato ST 16 - 16 % mancozeb formulated as a dust. Container size - 20 kg.

Crops:

Potatoes.

Diseases Controlled:

Fusarium seed piece decay in potatoes.

Crop Stage:

Potato seed piece - Apply before planting. If treated whole seed is cut, make a second application to protect cut surfaces. Plant as soon as possible after treating. If cut seed is not planted immediately, store in a ventilated location to allow cut surfaces to dry.

How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity.

Cost:

Potato ST 16 - $2.27/100 kg cut seed.

MancoPlus - $2.25/100 kg cut seed.

Tuberseal - $2.28/100 kg cut seed.

(2000 suggested retail prices).

Rates:

Potato ST 16 - 0.5 kg/100 kg seed.

MancoPlus, Tuberseal - 0.5 kg/100 kg seed.

Restrictions:

Grazing: Do not use treated seed for feed or food.

Storage: Store in cool, dry, well-ventilated place. Keep away from fire and sparks.

Environmental: Do not contaminate any body of water.

Hazard Rating:

Warning Poison

Purogene

Company:

Bio-cide International Inc.
Distributed by United Agri Products

Formulation:

2 percent chorine dioxide formulated as a liquid. Container size - 18.9 L.

Crop:

Stored potatoes.

Diseases Controlled:

Late blight.

Crop Stage:

Prior to storage and in storage treatment for harvested potato tubers.

Cost:

$25.87/L (2000 suggested retail price).

Rate:

Must be activated prior to use. To activate, add up to 45 grams of food grade citric acid per litre of Purogene concentrate. Add the Purogene concentrate to the mixing tank before adding the citric acid and follow with the dilution with water to achieve the desired concentration.

Water Volumes:

Treatment of water used to spray or rinse potatoes prior to storage:

Apply 16.3 to 32.6 mL of product per tonne of potatoes.

Humidification Water:

1. For continual treatment of known high-risk storage, an initial treatment of activated Purogene should be proportioned into the humidification water at a rate of 10 mL/L of humidification water to provide 200 ppm Total Available Chlorine Dioxide. Following the initial treatment, do not exceed a rate of 50 ppm of product or 2.3 mL/L of humidification water.
2. For the periodic treatment of unknown risk storage, use activated Purogene at a rate of 10mL/L (200 ppm) as needed.

Do not add more than 8.35 L of Purogene concentrate per month to humidification water per 500 tonnes of potatoes.

For more information and instructions for use contact United Agri Products at 1-800-265-4624.

How it Works:

Chlorine dioxide is an inorganic compound with contact activity.

Registered Mixes:

None.

Restrictions:

Storage: Keep away from heat, sparks and open flame. Do not expose to direct sunlight.

Re-entry: Do not re-enter treated storage bins for 2 hours after application. After in storage application the storage bin should be sprayed with fresh air for a minimum of 2 hours before re-entry. If it is necessary to enter storage area prior to 2 hours post-application, then a NIOSH/MSHA approved air supplied SCBA respirator must be worn. Signs restricting access to the storage bins must be posted during application and for 2 hours post-application.

Use: Do not use treated potatoes determined to be unfit for human consumption for animal feed. Treated potatoes must be washed with potable water before being marketed for transformation or consumption.

Environmental: Do not discharge effluent containing the Purogene into bodies of water, streams or other aquatic systems.

Hazard Rating:

Warning Poison
Warning Eye Irritant

Temporary Registration:

Expires September 30, 2001

Quadris

Company:

Syngenta

Formulation:

250 g/L azoxystrobin formulated as a suspension concentrate flowable fungicide.

Container size – 4 x 3.78 L jugs per case

Crops:

Canola.

Diseases Controlled:

For the control of blackleg, Sclerotinia stem rot and Alternaria black spot.

Crop Stage:

Blackleg: Apply at the 2 to 6 leaf stage of canola.

Alternaria black spot: Apply at early pod stage (90% petal fall).

Sclerotinia stem rot: Apply at early bloom (prior to 30% bloom). This will also suppress Alternaria black spot.

How it Works:

The active ingredient azoxystrobin is a methoxyacrylate compound used as a broad spectrum preventative and curative fungicide.

Cost:

$18.95/acre for control of blackleg and Alternaria black spot.

$26.87 to $37.90/acre for control of Sclerotinia stem rot.

(2000 suggested retail price)

Rate:

Blackleg and Alternaria black spot: Use 0.2 L/acre.

Sclerotinia stem rot: Use 0.28 to 0.4 L/acre for the control of Sclerotinia stem rot. Use the higher rate if there is a history of Sclerotinia infection in the area and when conditions favour development (heavy crop canopy, high humidity and/or excessive rain).

Water Volume:

Ground: Use sufficient water volume for coverage. Use minimum 9 gallons/acre (40 L/acre).

Aerial: Use minimum of 4 gallons/acre (18 L/acre). Ensure uniform application.

Registered Mixes:

None.

Restrictions:

Preharvest Interval: 30 days.

Recropping: Do not plant broadleaf or root crops within 30 days of application. Do not plant cereals within 45 days of application.

Application: Do not apply during periods of dead calm, when winds are gusty or when wind speed is greater than 15 km/hr at 2 m about ground at the site of application.

Environmental: For ground application maintain a 1 m buffer zone between areas sprayed and aquatic systems. For aerial application allow a 6 m buffer zone. Quadris can be extremely phytotoxic to certain apple varieties. Do not apply where there is the possibility of spray drift reaching apple trees.

Hazard Rating:

None.

Raxil FL

Company:

Gustafson

Formulation:

8.33 g/L tebuconazole formulated as a liquid seed treatment.

Container size – 2 x10 L, 200 L

Crops:

Wheat and barley.

Diseases Controlled:

Wheat: Loose smut, sinking smut or common bunt, seed rot and seedling blights caused by *Fusarium*. Suppression of common root rot caused by *Cochliobolus sativus*.

Barley: False loose, covered and true loose smuts, barley leaf stripe, seed rot and seedling blights caused by *Fusarium*.

Crop Stage:

Seed treatment.

How it Works:

The active ingredient tebuconazole is a systemic, triazole fungicide that provides broad spectrum protection against seed and soil-borne diseases.

Cost:

$1.80/25 kg seed (low rate) (2000 suggested retail price).

Rate:

45 – 60 mL / 25 kg of seed. One 10 L container will treat 5,556 – 4,167 kg of seed.

Use the higher rate for suppression of common root rot in wheat.

Application:

Raxil FL is a ready to use formulation designed for commercial or on-farm treatment with conventional seed treating equipment which can accurately control application rates and provide a good distribution of chemical onto seed. It is important that the seed and chemical are mixed quickly and uniformly. See manufacturer's instructions supplied with the treater system.

Uniform coverage at the correct rate is important for satisfactory results. Under-treatment may lead to loss of efficacy and over-treatment could reduce germination. Seed may be planted immediately after treating. All seed carried to the next year should be checked for germination before planting.

Treater calibration can be affected by temperature and should be rechecked on a regular basis. Undiluted product can be used at temperatures down to –10°C.

Restrictions:

Storage: If containers of Raxil FL have been stored for several months, some settling may occur that requires agitation. If 10 L containers are stored they should be shaken.

Use: Treated seed should be labelled **"This seed has been treated with Raxil FL (tebuconazole), do not use for food, feed or processing".**

Do not reuse container for any purpose. Augers used for handling treated seed should not be used to move seed for feed, food or oil processing. Do not reuse bags from treated seed to handle food or feed products..

Environmental: Do not feed or graze livestock on treated areas for 4 weeks after planing. Do not contaminate feed or foodstuffs with treated seed. Do not contaminate pods, lakes or streams.

Resistance: Raxil FL contains a triazole fungicide. Some loss of disease control may occur over time if Raxil FL or other fungicides in this group are used repeatedly or consecutively in successive years on same fields, due to the development of resistant strains of pathogens. Alternate use of Raxil FL with fungicides with a different mode of action (i.e. Vitavax) in your disease control program.

Precautions:

Germination will not be affected by treatment as long as over application does not occur and seed is properly stored. All seed carried from one year to the next should be checked for germination before planting.

Keep out of reach of children. Work in a well ventilated area when treating seed or while augering or handling treated seed. Wear chemical resistant gloves when handling Raxil FL or treated seed

Hazard Rating:

Danger skin irritant.

Ridomil Gold/Bravo

Company:

Syngenta

Formulation:

500 g/L chlorothalonil and 480 g/L metalaxyl-M in a Twin-Pak Jug. Container size - 8.83 L.

Crops:

Potatoes.

Diseases Controlled:

Early blight, late blight, late blight tuber rot, Botrytis vine rot. Suppression of Pythium leak and Pinkrot.

Crop Stage:

Begin preventive applications, early in the season when conditions are favourable for disease, (before infection), but no later than when the plant foliage meets within the row uniformly across the field. Apply a second and third application at 14-day intervals. The labelled rate of a registered contact fungicide should be applied 7 days after each application. Do not make more than three applications per season.

How it Works:

The chlorothalonil component is a phthalimide fungicide with contact activity. The metalaxyl component is an acylalanine fungicide with systemic activity.

Cost:

$27.95/acre (2000 suggested retail price).

Rate:

One 8.83 L jug treats 10 acres. The entire contents of the jug must be added to the spray tank or an improper mixture will result.

Water Volume:

Ground - use sufficient water to ensure thorough coverage of foliage. Use a water volume of 20 to 140 gallons/acre (90 to 640 L/acre).

Aerial - use a minimum water volume of 5 gallons water/acre (23 L/acre).

Tank Mixes:

None registered.

Restrictions:

Resistance: Strains of late blight resistant to metalaxyl may develop especially when applied after disease is present. If late blight develops in the field, contact government Potato Specialist or Plant Disease Specialist.

Storage: Protect from excessive heat.

Application: Do not make more than 3 applications per season.

Environmental: Do not apply where runoff is likely to occur. Do not use on coarse textured gravelly soils, soils with less than 2% organic matter or in areas where the water table may be high. Avoid application when weather favours drift. Avoid application by ground or air near or around bodies of water. Do not contaminate streams or ponds by spray drift, by cleaning equipment, or disposal of wastes. A buffer zone of 100 m for aerial application and 15 m for ground application should be observed to protect water bodies.

Hazard Rating:

Warning Poison
Warning, causes severe eye damage.

* Ridomil is a registered trademark of Syngenta Canada Inc.

Bravo is a registered trademark of a Syngenta Group company.

Ronilan EG

Company:

BASF Canada Inc.

Formulation:

50 % vinclozolin formulated as an extruded granular fungicide.

Container size - 12 kg (0.4 kg/PVC bag, 6 x 0.4 kg/pouch, 5 x 2.4 kg/pouch per box).

Crops:

Canola, beans.

Disease Controlled:

Canola - Sclerotinia stem rot.

Beans - Sclerotinia (white mould) and Botrytis (greymold).

Crop Stage:

Canola - Apply once at 20 - 50 % bloom, usually 4 to 8 days after first blooms appear in field.

For two applications, apply first at early bloom (20 - 30%) with a second application 7 days later at late bloom (70%) if the disease persists or weather conditions are favourable for disease development.

Beans - Apply at early to mid bloom (30 - 50 %) with or without a second application 7 to 14 days later at full bloom if disease persists, or weather conditions are favourable for disease development.

How it Works:

The active ingredient vinclozolin is an oxazolidine fungicide with contact activity.

Cost:

$12.24 to $24.48/acre (canola)

$24.48 to $48.96/acre (beans)

(2000 suggested retail prices).

Rate:

Canola - 0.30 - 0.40 kg/acre. The high rate is used when conditions favor sclerotinia development (heavy crop canopy, high humidity, and/or excessive rain).

For split application, 0.2 kg/acre per treatment at early bloom (20-30%) and again 7 days later.

Beans - 0.4 kg/acre if using 2 applications/year, 0.6 kg/acre if using 1 application/year. Do not apply more than 0.8 kg/acre per season.

Water Volume:

Canola (by ground) - 10 to 20 gallons/acre (45 to 90 L/acre).

Canola (by air) - Use minimum 3.6 gallons/acre (16 L/acre).

Beans - Use sufficient spray volume to obtain thorough coverage of foliage. Use 10 to 20 gallons/acre (45 to 90 L/acre). Ground application only.

Pressure:

Minimum 275 kPa (40 psi).

Effects of Weather:

Do not apply if rain or frost is expected. If rainfall is imminent, delay spraying. Do not treat plants at very low temperatures. Do not apply to any crops that have been stressed due to conditions such as flooding, drought, etc.

Registered Mixes:

Insecticides: Lorsban and Pyrinex. See label for details on rates. Ronilan EG must be added first to mix.

Do not use a product that contains boron.

Restrictions:

Grazing: Do not allow livestock to graze on treated crop.

Preharvest Interval: 45 days for beans, 40 days for canola.

Environmental: For ground application, maintain 15 m buffer zone between area sprayed and aquatic systems, for aerial application allow a 100 m buffer zone.

Storage: Store in original, tightly closed container in cool, dry, locked, well ventilated area without floor drain. Ronilan may be frozen.

Hazard Rating:

Caution Poison

Rovral Flo

Company:

Aventis CropScience

Formulation:

240 g/L iprodione formulated as a liquid flowable.
Container size - 8.4 L.

Crop:

Canola

Diseases Controlled:

Sclerotinia stem rot and suppression of Alternaria black spot.

Crop Stage:

Sclerotinia stem rot: Apply when crop is at the 20 to 30 % bloom stage (i.e. when crop is at or approaching full bloom and prior to significant petal drop). For Argentine varieties when 15-20% flowers open (including small pods) on the main stem. For Polish varieties when 11-15% flowers (including small pods) are open on the main stem. Good coverage of plants is essential.

Alternaria black spot: Apply as a single spray at early green pod, or as split application: the first application at full bloom, followed by a second application at early green pod stage. Early green pod stage occurs when almost all canola pods are fully formed and still green with only a few flowers or undeveloped pods remaining at the top of the plant. Good coverage of plants is essential.

How it Works:

The active ingredient iprodione is a dicarboximide fungicide with protective and eradicant activity.

Cost:

$20.74 to $30.50/acre

(2000 suggested retail price).

Rate:

Sclerotinia stem rot: 0.85 to 1.25 L/acre. Use of the higher rate is recommended for fields with a history of heavy disease pressure.

Alternaria black spot: A single application of 0.85 L/acre at early green pod. Split applications: 0.46 L/acre at full bloom followed by 0.46 L/acre at early green pod stage.

Water Volume:

Ground: 10 gallons/acre (45 L/acre)
Air: Not less than 4.5 gallons/acre (20 L/acre)

Nozzles:

Flat fan or hollow cone for ground and properly calibrated aerial equipment.

Effects of Weather:

Do not spray in heavy dew or when rain is imminent within one hour. Spraying should be carried out in crosswind where possible. Avoid spraying in a dead calm and when wind speeds exceed 20 km/hr.

Tank Mixes:

Rovral should not be mixed with other pesticides, adjuvants or fertilizers except where stated.

Restrictions:

Storage: Protect from frost.

Preharvest Interval: 38 days

Application:

Do not make more than 2 applications per season.

Hazard Rating:

Caution Poison

Senator 70WP

Company:

Engage Agro Corporation

Formulation:

70 % thiophanate-methyl formulated as wettable powder. Container size - 2 kg.

Crops:

White beans.

Diseases Controlled:

Sclerotinia (white mould).

Crop Stage:

Apply when conditions favour disease development (i.e. , warm, humid weather and heavy, dense foliage). This usually occurs during early bloom stage, prior to rows closing in. If conditions favouring disease persist, repeat applications may be warranted.

How it Works:

The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity.

Cost:

Not available.

Rate:

0.7 to 0.9 kg/acre (one container treats 2.14 to 1.67 acres).

Water Volume:

15 to 20 gallons/acre (70 to 90 L/acre).

Nozzles:

Ground - Flat fan.

Air - Hollow cone.

Registered Mixes:

Senator 70WP is compatible with most pesticides.

Do not mix with lime or other alkaline materials.

Restrictions:

Grazing: Do not feed or allow livestock to graze on treated crops.

Storage: Store in a dry place.

Resistance: Experience has shown that strains of fungi resistant to thiophanate methyl may develop in treated crops.

Senator Potato Seed Piece Treatment

Company:
Engage Agro Corporation

Formulation:
10 % thiophanate-methyl formulated as dust.
Container size - 10 kg.

Crops:
Potatoes (seed piece treatment only).

Diseases Controlled:
Fusarium rot, Verticillium wilt, Silver scurf. Also aids in control of Seed piece decay and Blackleg infections.

Crop Stage:
Preplant seed piece treatment. Cut pieces should be treated within 6 hours of cutting. For optimum control of silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential

How it Works:
The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity.

Cost:
$102.95/bag (2001 expected suggested retail price).

Rate:
0.5 kg per 100 kg cut seed (one bag treats 2,000 kg seed).

Registered Mixes:
Do not mix with lime or other alkaline materials.

Restrictions:
Grazing: Do not use treated seed for feed or food.

Environmental: Do not contaminate domestic or irrigation water supplies, lakes, streams and ponds.

Storage: Store in a dry place.

Resistance: Strains of fungi may develop tolerance to Senator PSPT or other products in the same class of chemistry after prolonged use. Use full label rates of Senator PSPT and ensure thorough coverage. When possible alternate with products from different chemical families. If potatoes are going to be treated with Mertect prior to storage in the fall, do not use Senator PSPT or any other product containing thiophanate-methyl at planting.

Do not use Senator PSPT or any other product containing thiophanate-methyl if Mertect was used as the storage treatment on the seed. Use a seed treatment with a different mode of action on Mertect treated seed potatoes. Implement an integrated disease management program that helps to maintain lower inoculum levels. This includes planting disease free tubers, crop rotation, and good hygiene in storage bins.

Tattoo C

Company:

Aventis CropScience

Formulation:

375 g/L propamocarb HCl and 375 g/L chlorothalonil formulated as a suspension. Container size - 10 L.

Crops:

Potatoes.

Disease Controlled:

Late blight.

Crop Stage:

Begin applications when conditions are favourable for disease, but before infection, and continue on 7 to 14-day intervals until threat of disease is over. Use the 7-day interval when the risk and conditions for disease are high. To avoid resistance, rotating and alternating applications with fungicides having different modes of action is recommended if multiple fungicide applications are required. Make no more than 3 applications per season.

How it Works:

The active ingredient propamocarb HCl is a carbamate fungicide with systemic activity. Chlorothalonil is a phthalimide fungicide with contact activity.

Cost:

$30.20/acre (2000 suggested retail price).

Rate:

1.09 L per acre.

Water Volume:

17.8 to 26.7 gallons/acre (80 to 120 L/acre).

Restrictions:

Storage: Keep away from fire, open flame or other sources of heat. Do not store below freezing. Store the tightly closed container away from seeds, fertilizers, plants and foodstuffs.

Application: Do not apply by air. Treatment with any product containing chlorothalonil must be separated by a minimum of 7 days.

Recropping: Do not plant a new crop in the treated area within 120 days of the last application.

Grazing: Do not feed treated crops to livestock.

Preharvest Interval: 7 days.

Resistance: Plant diseases can develop resistance when exposed to one type of product or even products of similar chemistry. Use cultural practices and fungicide rotation as well as early preventive fungicide applications. Consult the government Potato Specialist or Plant Disease Specialist for disease outbreak forecasts and recommendations.

Re-entry: Do not re-enter treated areas within 48 hours after treatment. If required, individuals may re-enter treated areas within 48 hours for short tasks not involving hand labour, provided that 4 hours have passed since application and that long pants and a long-sleeve shirt are worn.

Environmental: Do not apply directly to water or areas where surface water is present. Do not apply where runoff is likely to occur. Do not contaminate water when disposing of equipment wash waters. Allow a buffer zone of 15 m around bodies of water when applying.

Thiram 75WP

Company:
Gustafson

Formulation:
75 % thiram formulated as wettable powder.
Container sizes - 5 kg, 25 kg.

Crops:
Mustard, grasses, dry beans, peas, soybeans, safflower, corn, and alfalfa.

Diseases Controlled:
Seed decay, seedling blight, damping off.

Crop Stage:
Seed treatment.

How it Works:
The active ingredient thiram is a dithiocarbamate fungicide with contact activity.

Cost:
$2.95/25 kg of mustard, grass seed.
$0.83 - $1.13/25 kg of dry bean, pea, soybean seed.
$0.98/25 kg of field corn seed.
$1.63/25 kg of safflower seed.
(2000 suggested retail prices).

Rate:

CROP	KG THIRAM/ 25 KG SEED	AMOUNT OF SEED (KG) ONE 5 KG PACKAGE TREATS
Mustard, grasses, alfalfa	0.09	1,389
Dry beans, peas, soybeans	0.025 to 0.035	5,000 - 3,571
Field corn	0.03	4,166
Safflower	0.05	2,500

Compatibility with Rhizobia Inoculum:
Thiram is compatible with rhizobia, however, some restrictions may apply in storage length with Thiram-treated seed inoculated with rhizobia. Contact rhizobia manufacturer on use patterns with their rhizobia strain.

Restrictions:
Grazing: Do not use treated seed for food or feed. Do not graze for 4 weeks after planting. Do not sell treated seed to oil mills. Label treated seed **"Do not use for food or feed. This seed has been treated with thiram."** Do not graze treated areas or feed clippings from treated areas to livestock.

Storage: Store in a cool, dry, ventilated place. Keep away from flame, sparks and heat. Unplanted treated seed must be labelled.

Precautions:
Do not consume alcohol 24 hours before or after working with thiram.

Hazard Rating:
Warning Poison

Tilt 250E

Company:
Syngenta

Formulation:
250 g/L propiconazole formulated as an emulsifiable concentrate. Container sizes - 5 L, 4 x 5 L.

Crops:
Winter and spring wheat (including hard red, durum, Canada Prairie, soft white)

Spring Barley

Oats

Canola.

Diseases Controlled:

WHEAT	BARLEY	OATS	CANOLA
Septoria leaf spot Tan Spot Septoria glume blotch Stripe rust Powdery mildew Leaf and stem rust	Spot blotch Net blotch Scald Leaf rust Stem rust Septoria leaf spot Powdery mildew	Septoria leaf blotch Crown rust	Blackleg

Crop Stage:
Wheat, barley, oats: Apply at the very early stage of disease development, anytime from the beginning of stem elongation to before the head is half emerged. Best results have been achieved when Tilt is applied just when the flag leaf emerges. Tilt 250E last about 3 weeks in the plant. If conditions favourable to disease continue, another application may be necessary. The second application is usually applied at the time of head emergence.

Canola: Apply during the rosette stage (after second true leaf and prior to bolting).

How it Works:
The active ingredient propiconizole is a triazole fungicide with broad spectrum systemic activity.

Cost:
$13.56/acre (2000 suggested retail price).

Rate:
0.2 L/acre. One 5 L container treats 25 acres.

Water Volume:
Ground: Minimum 18 gallons/acre (80 L/acre).

Air: 4 to 5 gallons/acre (16-20 L/acre).

Nozzles:
Ground: Flat fan.

Air: Flat fan or hollow cone.

Registered Mixes:
In wheat and barley, Tilt may be applied with: 2,4-D amine, MCPA amine, Buctril-M or Pardner.

To ensure weed and disease control:

1. Weeds and crops must be at correct growth stage.
2. Tank mixes of Tilt and Buctril-M or Pardner can only be applied by ground.
3. 2,4-D and MCPA formulations can be applied by ground or air.
4. Tilt may be applied with small amounts of nitrogen. Rate of actual N not to exceed 4 kg/acre (9lb/acre). Add the nitrogen to the spray tank before adding Tilt. Excessive nitrogen or application during hot weather may result in crop injury. Do not add nitrogen when tank-mixing Tilt with a herbicide.

Effects of Weather:
If rainfall occurs within 1 hour of application, reapplication is necessary. Wind speed should be less than 18 km/hr to avoid drift. High humidity and low temperature (10 - 20 °C) allow for better deposition of spray droplets.

Restrictions:

Grazing: Do not graze animals on treated green crops within 3 days of application.

Preharvest Interval: Wheat, oats, barley - 45 days. Canola - 60 days.

Recropping: None.

Storage: Do not freeze.

Environmental: Do not contaminate food or feed. This pesticide is toxic to fish. Do not spray any body of water by direct application, drift or by cleaning equipment.

Hazard Rating:

Caution Poison

Vitavax rs Fungicide

Company:

Gustafson

Formulation:

5.97% carbathiin and 11.94% thiram as a liquid seed treatment.

Container size – 100 L, 1000 L

Crops:

Canola and rapeseed.

Diseases Controlled:

Seed-borne blackleg, seed rot and seedling blight caused by Rhizoctonia, Pythium and Alternaria.

How it Works:

The active ingredient carbathiin has systemic activity and the active ingredient thiram has contact activity.

Cost:

Not available.

Rate:

1.25 L /100 kg of seed

100 L will treat 8000 kg of seed

Application:

Thoroughly agitate product before use.

Vitavax rs Fungicide treated seed does not require drying after treatment.

Registered Mixes:

Can be co-applied on the seed with Apron FL and Gaucho 480. Part of Gaucho Platinum and Gaucho Canola System.

Restrictions:

Storage: Store product in original container only, away from other pesticides, fertilizer, food or feed. Treated canola or rapeseed stored for periods more than 9 months should be tested for germination before planting.

Storage of Vitavax rs fungicide at low temperatures is not recommended. Keep product above 10°C prior to and during application.

Do not store treated seed above 25°C or in direct sunlight.

Use: Treated seed should be labelled **"This seed has been treated with Vitavax rs Fungicide, containing carbathiin and thiram, do not use for food, feed or oil processing"**

Do not reuse container for any purpose. Augers used for handling treated seed should not be used to move seed for feed, food or oil processing. Do not reuse bags from treated seed to handle food or feed products.

Environmental: Do not feed or graze livestock on treated areas for four weeks after planting. Do not contaminate ponds, lakes or streams. Do not contaminate feed or foodstuffs with treated seed.

Precautions:

Work in a well ventilated area when treating seed or while augering or handling treated seed. Wear chemical resistant gloves when handling treated seed. Keep out of reach of children. Because of possible unpleasant side effects, alcoholic beverages should be avoided for 24 hours before or after treating with Vitavax rs Fungicide.

Hazard Rating:

Caution Poison.

Vitavax Dual Powder/Vitavax Dual Solution/ Vitaflo Dual Purpose

Company:

Gustafson

Formulation:

Vitavax Dual Powder - 20 percent carbathiin, 28.9 percent thiram, and 18.7 percent lindane formulated as powder. Container size - 1.5 kg.

Vitaflo Dual Purpose - 8.9 percent thiram, 10.1 percent carbathiin, and 12.9 percent lindane formulated as a liquid seed treatment. Container sizes - 10 L, 200 L.

Vitavax Dual Solution - 180 g/L carbathiin and 165 g/L lindane formulated as a solution. Container sizes - 10 L, 200 L.

Crops:

Vitavax Dual Powder - Wheat, barley, oats, rye, flax.

Vitavax Dual Solution - Wheat, barley, oats, rye.

Vitaflo Dual Purpose - Wheat, barley.

Diseases Controlled:

PRODUCT	BARLEY	OATS	WHEAT	RYE	FLAX
Vitavax Dual Powder	False loose smut True loose smut Covered smut	Loose smut Covered smut	Loose smut Stinking smut (Bunt)	Stem smut Damping off Seed decay	Damping off Seed decay
Vitavax Dual Solution	False loose smut True loose smut Covered smut *suppression of leaf stripe, net blotch, common root rot	Loose smut Covered smut *suppression of common root rot	Loose smut Stinking smut *suppression of common root rot	Stem smut *suppression of common root rot	
Vitaflo Dual Purpose	False loose smut True loose smut Covered smut		Loose smut Stinking smut (Bunt)		

*will not protect post-seedling plants from infection.

Seed-borne seed rots and seedling blights are generally reduced with both powder and solution.

Insects Controlled:

Wireworms.

Crop Stage:

Seed treatment.

How it Works:

The active ingredient carbathiin has systemic activity. The active ingredient thiram is a dithiocarbamate fungicide with contact activity. The active ingredient lindane is an organochlorine insecticide acting as a contact and stomach poison.

Cost:

Cost to treat 25 kg of seed (2000 suggested retail prices):

CROP	VITAVAX DUAL SOLUTION	VITAVAX DUAL POWDER	VITAFLO DUAL PURPOSE
Wheat	$2.90 - $3.47	$3.20	$2.86
Barley	$2.90 - $3.47	$3.43	$3.57
Oats	$2.90	$4.67	
Rye	$2.90	$2.94	
Flax		$3.43	

Rates:

	VITAVAX DUAL POWDER		VITAVAX DUAL SOLUTION		VITAFLO DUAL PURPOSE	
CROP	GRAMS POWDER/ 25 KG SEED	KG SEED TREATED/ CONTAINER	mL/25 KG SEED	KG SEED/10 L CONTAINER	mL/25 KG SEED	KG SEED/10L CONTAINER
Wheat	55 to 65	681 to 576	75 to 90	3,332 to 2,778	65	3,846
Barley	70	535	75 to 90	3,332 to 2,778	81	3,077
Oats	95	395	75	3,332		
Rye	60	625	75	3,332		
Flax	70	535				

Water Volume:

Do not dilute Vitavax Dual Solution with water.

Restrictions:

Grazing: Do not graze or feed livestock on treated area for 4 weeks after planting. Do not use treated seed for feed, food or oil processing. Treated seed must be labelled as follows: **"This seed has been treated with Vitavax Dual Solution Powder or Vitaflo Dual Purpose Seed Protectant - contains carbathiin, thiram and lindane; do not use for food, feed or oil processing."**

Storage: Do not store Vitavax Dual Solution below 0°C and keep away from spark and flame. Store powder in a dry place. Do not store seed treated with Vitavax Dual Powder. Do not store Vitaflo Dual Purpose above 35°C or in direct sunlight.

Precautions:

Vitavax Dual Powder and Vitaflo Dual Purpose contain thiram. Do not consume alcohol 24 hours before or after working with product or thiram-treated seed.

Comments:

Vitavax Dual Solution may damage painted surfaces by removing paint or leaving stain.

Hazard Rating:

Vitavax Dual Solution - Warning Poison

Vitavax Dual Powder - Danger Poison

Vitaflo Dual Purpose - Danger Poison

Vitavax Powder/Vitaflo-280

Company:

Gustafson

Formulation:

Vitavax Powder - 26.7 percent carbathiin and 38.8 percent thiram formulated as powder. Container size - 1.5 kg.

Vitaflo-280 - 14.9 percent carbathiin and 13.2 percent thiram formulated as a suspension. Container sizes - 10 L, 200 L.

Crops:

Vitavax Powder - Oats, barley, wheat, rye, flax, soybeans, bromegrass.

Vitaflo-280 - Oats, barley, wheat, rye, triticale, flax, linola soybeans, dry beans, corn, peas, lentils.

Diseases Controlled:

Seed-borne seed rots and seedling blights are generally reduced. Refer to next page.

Crop Stage:

Seed treatment only.

How it Works:

The active ingredient carbathiin has systemic activity. The active ingredient thiram is a dithiocarbamate fungicide with contact activity.

Cost:

Cost to treat 25 kg of seed with
Vitaflo-280
$1.16 - 1.68 (wheat, barley, rye)
$1.02 (triticale)
$1.68 (peas, lentils, oats)
$2.67 (flax)
$1.32 (beans, soybean)

Vitavax Powder
$55.10 per container, $36.73/kg product
(2000 suggested retail prices).

Application:

Vitaflo-280 can be diluted with water for use in slurry treaters. Dilute Vitaflo-280 as required to apply the specified rate of undiluted Vitaflo-280. Specific directions regarding dilution are contained in the Vitaflo-280 Operating Manual. Vitaflo-280 Operating Manual is available from your local Vitaflo dealer or by writing Uniroyal Chemical Elmira, Ontario. Agitate while diluting and continue agitating for approximately two minutes after diluting. Keep in constant agitation and use within 24 hours of diluting. DO NOT USE SLURRY TREATMENT FOR FLAX.

Vitaflo-280 should be used undiluted in all commercial seed treaters other than slurry treaters. Treater calibration should be rechecked if the Vitaflo-280 temperature falls below -18°C. Undiluted Vitaflo-280 can be used at temperatures down to -30°C.

Tank Mixes:

Mixing of Vitaflo-280 with solvent based products may result in gelling or sedimentation. Seed treater lines and reservoirs should be thoroughly cleaned before use of Vitaflo-280. To clean, flush with water containing detergent.

Compatibility with Rhizobia Inoculum:

Vitaflo 280 is compatible with rhizobia. Do not tank mix Vitaflo 280 and rhizobia. However, rhizobia and Vitaflo 280 can either be simultaneously applied to the seed through separate delivery systems or applied sequentially. Always check with your rhizobia manufacturers on any restrictions that may exist when used with seed treatment.

Cereals:

PRODUCT	WHEAT	BARLEY	OATS	RYE	TRITICALE
Vitavax Powder	Loose smut Stinking smut (bunt)	False loose smut True loose smut Covered smut	Loose smut Covered smut	Stem smut Seed decay Damping off	
Vitaflo-280	Loose smut, Stinking smut (bunt), Seed decay, Seedling blight	False loose smut True loose smut Covered smut Seed decay Seedling blight Suppression of: Net Blotch	Loose smut Covered smut Seed decay Seedling blight	Stem smut Damping off Seedling blight Seed rot Seedling blight	Damping off Seedling blight Seed decay

Special Crops:

PRODUCT	FLAX/LINOLA	SOYBEANS	DRY BEANS	CORN	LENTILS, PEAS
Vitavax Powder	Damping off Seed decay	Damping off Seed decay			
Vitaflo-280	Damping off Seed decay	Damping off Seed decay	Damping off Seed decay	Damping off Seed decay Seed-borne head smut	Damping off Seed decay

Rates:

SEED TYPE/QUANTITY	VITAVAX (GRAMS)	VITAFLO-280 (mL)
Wheat/25 kg seed	40 to 55	57 to 82*
Barley/25 kg seed	50	57 to 82*
Oats/25 kg seed	70	82
Rye/25 kg seed	45	57 to 82
Triticale/25 kg seed		50
Flax/25 kg seed	60	131
Soybeans/25 kg seed	65	65
Dry beans/25 kg seed		65
Corn/25 kg seed		70
Corn head smut/25 kg seed		140 to 187
Peas/25 kg seed		82
Lentils/25 kg seed		82

*Use higher rate for control of true loose smut in wheat and barley and stem smut of rye.

Restrictions:

Grazing: Do not graze or feed livestock on treated area for 4 weeks after planting. Do not use treated seed for feed, food or oil processing.

Storage: Store powder in a dry place. Do not store seed treated with Vitavax powder. Do not store Vitaflo-280 in direct sunlight or above 35°C. Vitaflo-280 will not freeze even at extreme temperatures. Do not store dry beans or soybeans treated with Vitaflo-280. See label for other treated seed storage restrictions.

Precautions:

Avoid drinking alcohol 24 hours before or after handling product or treated seed.

Hazard Rating:

Warning Poison

Vitavax rs Flowable/ Vitavax rs Dynaseal/Cloak

Company:

Gustafson

Formulation:

Vitavax rs Flowable - 45 g/L carbathiin, 90 g/L thiram, 680 g/L lindane formulated as a suspension.
Container sizes - 4 L, 100 L , 1000 L.

Vitavax rs Dynaseal - 40 g/L carbathiin, 80 g/L thiram, 600 g/L lindane formulated as a flowable suspension.
Container size - 100 L.

Cloak - 45 g/L carbathiin, 90 g/L thiram and 533 g/L lindane formulated as a flowable suspension.
Container sizes - 100 L, 1000 L.

Crops:

Canola (rapeseed) and mustard.

Vitavax RS Flowable and Cloak are also registered on cole crops.

Diseases Controlled:

CANOLA (RAPESEED)	MUSTARD
Seed decay Preemergence damping off Seed-borne blackleg	Seed decay Preemergence damping off

Insects Controlled:

Flea beetles.

Crop Stage:

Seed treatment only.

How it Works:

The active ingredient carbathiin has systemic activity. The active ingredient thiram is a dithiocarbamate fungicide with contact activity. The active ingredient lindane is an organochlorine insecticide with contact and stomach activity.

Cost:

Vitavax RS Flowable - $40.05 per 25 kg of seed.
Cloak - $32.08 per 25 kg of seed.
Vitavax RS Dynaseal - $39.15 per 25 kg of seed
(2000 suggested retail prices).

Rate:

CHEMICAL	RATE/25 KG SEED	KILOGRAMS OF SEED TREATED per 100 L CONTAINER
Vitavax RS Flowable	562 mL	4,444 kg
Vitavax RS Dynaseal	625 mL	4,000 kg
Cloak	562 mL	4,444 kg

Restrictions:

Environmental: Do not contaminate ponds, lakes or streams.

Grazing: Do not use treated seed for feed, food or oil processing. Do not contaminate feed or foodstuffs. Do not graze or feed livestock on treated areas for 4 weeks after planting. Treated seed must be labelled as follows: **"This seed has been treated with Vitavax RS Flowable or Dynaseal or Cloak (contains carbathiin, thiram and lindane). Do not use for feed or oil processing."**

Storage: Keep flowables above 10°C prior to and during application. Keep away from direct heat. Do not store seed treated with Flowable, Dynaseal or Cloak above 25°C or in direct sunlight. Seed treated with Flowable should have germination retested if stored for periods in excess of 9 months. Do not store cole crop seed that has been treated. Leftover seed should be double-seeded around headland or buried away from water source.

Precautions:

Do not consume alcohol 24 hours before or after working with fungicide containing thiram or the treated seed.

Hazard Rating:

Danger Poison

Vitavax Single Solution

Company:

Gustafson

Formulation:

230 g/L carbathiin formulated as a solution.
Container sizes - 10 L, 200 L.

Crops:

Barley, wheat, oats, rye, flax.

Crop Stage:

Seed treatment.

How it Works:

The active ingredient carbathiin has systemic activity.

Cost:

Cost to treat 25 kg of seed:
$1.42 to 1.70 (wheat)
$1.42 to 1.70 (barley)
$1.42 (oats)
$1.42 (rye)
$2.35 (flax)
(2000 suggested retail prices).

Diseases Controlled:

Seed-borne seed rots and seedling blights.

BARLEY	WHEAT	OATS	RYE	FLAX
Covered smut True loose smut False loose smut Seed rot Seedling blight *Suppression of net blotch, leaf stripe, common root rot	Loose smut Seed rot Seedling blight Stinking smut (bunt) *Suppression of common root rot	Covered smut Loose smut Seed rot Seedling blight *Suppression of common root rot	Stem smut Seed rot Seedling blight *Suppression of common root rot	Seed decay Damping off

* will not protect plants from infection beyond the first leaf stage

Rate:

CROP	mL/25 KG SEED	KG SEED TREATED/ 10 L CONTAINER
Wheat**	60 to 75	4,166 to 3,333
Barley**	60 to 75	4,166 to 3,333
Oats	60	4,166
Rye	60	4,166
Flax	100	2,500

** For wheat and barley varieties highly susceptible to true loose smut and for high levels of smut or bunt on seed, the 75 mL rate will give increased disease control.

Water Volume:

Do not dilute with water.

Restrictions:

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting. Do not use treated seed for feed, food or oil processing. Treated seed must be labelled as followed: **"This seed has been treated with Vitavax Single Solution Seed Protectant. Contains carbathiin; do not use for food, feed or oil processing."** Do not contaminate feed or foodstuffs.

Storage: Do not store below 0°C. Product is flammable. Keep away from flame and sparks.

Environmental: Do not contaminate ponds, lakes or streams.

Comments:

Product may damage painted surfaces by removing paint or leaving stain.

Do not use rubber or PVC hose.

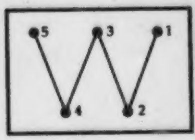
Insect Control

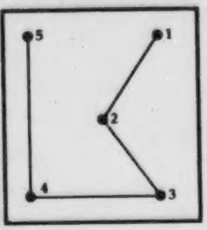
Field Scouting

Field scouting is the regular examination of fields to accurately assess the kind and the number of insects present and the amount of damage being done. Scouting should be done weekly during the growing season and daily when infestations approach economic levels or when weather conditions favour the rapid development of specific pests.

To properly scout for insect pests, you must know when they occur, where they live, what they look like, and how to find and count them. Generally, in fields of less than 100 acres, check a minimum of five locations. In fields greater than 100 acres, check a minimum of 10 locations. There are several possible scouting patterns that can be used when checking fields. These options are based on pest distribution and field configuration.

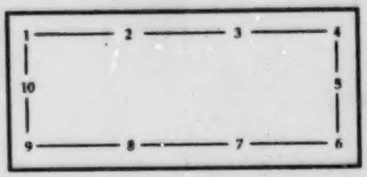
Pattern 1: Used when pests are uniformly distributed.





This scouting pattern typically looks like an X, Z or W, excluding field edges. Pests that fit this pattern include aphids, bertha armyworm, diamondback moth, lygus bugs.

Pattern 2: Used when pests are at the edges of fields.



Scout by walking along field edges, fence lines or ditches. Some examples of pests appearing at the edges of fields include flea beetles, colorado potato beetles and grasshoppers.

The following table outlines monitoring methods, typical symptoms and **economic thresholds** for the more common crop pests. The economic threshold is the minimum number of insects or damage to the crop where the cost of an insecticide or control measure is less than the yield loss if the control is not used. Note that factors such as moisture, temperature conditions and stage of crop growth, can increase or decrease the impact of insects on crop production.

Field Monitoring and Economic Thresholds for Insects

INSECT	CROP	WHEN AND HOW TO MONITOR	TYPICAL DAMAGE	ECONOMIC THRESHOLD
Aphids	Cereals	- July through early August - check 10 plants at each stop - record total number of aphids and calculate average per plant	Visible wilting of plants, yellow patches in fields, plants are sticky	12-15 aphids/ stem until about 2 weeks after flowering
	Peas	- July when crop flowers - check 10, 8 inch (20 cm) plant tips at each stop - record total number of aphids and calculate average per plant tip		2-3 aphids per 8 inch (20 cm) plant tip when 50 percent of plants have produced some young pods
	Alfalfa	- July through August - take 5 sweeps at each location - record total number of aphids and calculate average per sweep	Wilting of plants, plants are sticky	200 aphids/ sweep
	Flax	- mid-July to mid-August - check 10 plants at each stop - record total number of aphids and calculate average per plant	Wilting of plants, plants are sticky	3 or more aphids per main stem at full flower or 8 or more aphids per main stem at green boll stage

INSECT	CROP	WHEN AND HOW TO MONITOR	TYPICAL DAMAGE	ACTION THRESHOLD
Armyworms	Cereals	- mid-June through July - at each stop shake plants in 1 yard^2 (m^2) area and carefully check soil surface for dislodged larvae	Leaves stripped from plants, awns chewed from heads, heads clipped	10 larvae/yard^2 (m^2)
Bertha armyworms	Canola	- late July through early August - at each stop, shake plants in 1 yard^2 (m^2) area and carefully check soil surface for dislodged larvae - during heat of the day larvae will often be found under leaves on soil surface	Outer layers of stems and pods chewed resulting in whitish appearance, holes chewed in pods	10 to 34 larvae/yard^2 (m^2), depending on value of crop and cost of control.
Cutworms	All crops	- late May through mid-July - at each stop, check several 1 yard^2 (m^2) areas. Use trowel or shovel to carefully search through top half to 1 inch of soil for cutworm larvae	Plants cut off at or near soil surface, some leaf feeding above ground, plants missing from rows, bare patches appearing in field	3-4/yard^2 (m^2)
	Corn	- at each stop, examine 100 plants in a row - calculate percentage of plants cut off or showing leaf feeding		When 3 percent of plants are cut
	Sunflowers	- at each stop, examine 100 plants in a row		1 per foot^2 or when stand reduction exceeds 25-30 percent
Diamondback moths	Canola, mustard	- July through early August - examine 10 plants at each stop and calculate average per plant	Flowers clipped or chewed, outer layers of stem and pods chewed, holes chewed in pods	100 to 150 larvae/m^2 in immature and flowering fields.* 200 to 300 larvae/m^2 in podded canola fields.*
European corn borers	Corn	- at each stop, examine 10 plants for egg masses and signs of shot-holing - calculate percentage of plants with shot-holes	Shot-holes in leaves, holes in stalk, tassels and ears	When 50% of the plants have shot-holes in the leaves, caused by young corn borers

*Note that these threshold numbers are based on stands averaging 150 to 200 plants/m^2. In areas where stands are thinner the economic threshold should be lowered accordingly.

INSECT	CROP	WHEN AND HOW TO MONITOR	TYPICAL DAMAGE	ACTION THRESHOLD
Flea beetles	Canola	- May through June when crop is in seedling stage - examine 10 plants at random at each stop - estimate overall percentage leaf loss	Shot-holes in leaves, complete destruction of seedling plants late May through June. Holes chewed in pods in August (occasional)	When 25 percent of leaf surface is destroyed
Grasshoppers	All crops	- May through July - check along edges of crop, particularly areas adjacent to hayland and pastures - estimate number of hoppers/yard^2 (m^2)	Black strips along margins of newly emerging crops, head clipping later in season	When populations exceed 8 to 12/yard^2 (m^2). At flowering and podding stage of lentils the threshold is 2/m^2.
Lygus bugs	Canola	- Scout from just prior to bud formation until seeds within the pod have become firm. - make 10 180° sweeps with a 37 cm diameter insect net at each sampling site.	Attacked buds appear shrunken and bleached white. damaged seeds appear dark brown and shrivelled.	10-18 lygus bugs/10 sweeps from the end of flowering to early pod development in the upper canopy, and 15-25 lygus bugs/10 sweeps in early pod ripening stage.
Lygus bugs, plant bugs	Seed alfalfa	- June through mid-August - make five 180° sweeps with a 15 inch (40 cm) insect net through alfalfa canopy at each sampling site - record total number of plant and lygus bugs (both nymphs and adults) captured - calculate average number per sweep	Field blooms poorly or not at all, flowers drop prematurely, collapsed seed	4 to 5 plant or lygus bugs/sweep at bud stage and 8 to 10/sweep at seed stage
Sunflower beetles	Sunflowers	**Adults** - May through early June on seedling plants - examine 10 plants at random at each stop	Leaves of seedling plants chewed or completely destroyed late May through June, shot-holes or large areas of leaves chewed July through August	1 adult beetle per two seedling plants

INSECT	CROP	WHEN AND HOW TO MONITOR	TYPICAL DAMAGE	ACTION THRESHOLD
Sunflower beetles *(cont'd)*	Sunflowers	**Larvae** - July through mid-August - examine 10 plants at random at each sampling site - peel back leaves around growing tip and record total number of larvae found - calculate average number per plant	Leaves of plants chewed or completely destroyed	10 to 15/plant
Sunflower seed weevil	Sunflower - confectionery	- examine fields when ray petals begin to form and continue every 2 to 3 days until pollination is complete - examine 5 plants at each stop - brush heads vigorously to bring weevils to surface - record total number of weevils and calculate average per head	Seeds partly or completely destroyed, exit hole in hull Shrivelled kernels, kernels completely destroyed	1 to 2 weevils/ head
	Oil seed			12 to 14 weevils/head
Wheat midge	Wheat	- July when crop emerges from boot stage until flowering - check crop canopy at dusk for signs of wheat midge adult activity - at each stop, examine 10 heads - record the number of midge adults observed on or near heads - calculate average number of midge per head		For yield only: 1 adult midge per 4 to 5 heads To maintain optimum grade: 1 adult midge per 8 to 10 heads.

Additional information on insect biology, monitoring, and control can be found on the Manitoba Agriculture and Food Internet site at http://www.gov.mb.ca/agriculture and on the Saskatchewan Agriculture and Food Internet site at http://www.agr.gov.sk.ca/saf

Insect Control Decisions

Control of insects should be considered when numbers or damage exceed economic thresholds (when yield loss is greater in value than the cost of the control and its application). To select an insecticide, verify the registered products in Table 1 (p. 205) for the insect and field crop. Consideration should then be given to the rates, cost and preharvest intervals, the product application, restrictions, precautions and the hazard rating. The preharvest interval is the number of days that must pass between application and swathing or harvesting.

Degree of Risk and Hazard Rating:

(see page 10 for full description)

Danger poison: LD_{50} is less than 500 mg/kg and indicates high toxicity.

Warning poison: LD_{50} is between 500-1,000 mg/kg and indicates moderate toxicity.

Caution poison: LD_{50} is between 1,000-2,500 mg/kg and indicates low toxicity.

(LD_{50} values are used to rate the toxicity of pesticides. They refer to the dose of pesticide (in mg per kg) that is lethal to 50 percent of a test animal population).

Insecticides and Bees

All insecticides listed in the Guide are poisonous to bees and other pollinating insects. There are a number of common sense steps that should be taken to avoid accidental poisoning of bee colonies:

- Do not apply any insecticides to flowering crops during the time of day when bees are active.
- If it is necessary to spray a crop where honey bees are foraging, do so early in the morning or late evening when bees are not active.
- Contact the beekeeper at least 48 hours before insecticide application if bee colonies are near the field to be treated.
- Communication between growers, commercial pesticide applicators and beekeepers is still the most effective strategy for avoiding bee poisoning.

The following table indicates the maximum time required for the insecticides listed in the Guide to be degraded by weather to a low hazard level for bees. **These times are to be used as general guidelines only.** Most of these insecticides have not been tested for bee toxicity under western Canadian conditions and environmental conditions influence the rate at which pesticides degrade.

Field Hazard of Insecticides to Bees

INSECTICIDE	TOXICITY RATING		•RESIDUE HAZARD (DAYS)
	HONEY BEE	LEAFCUTTER BEE	
Admire	1	1	–[b]
Ambush/Pounce	1	1	5
Cygon/Lagon	1	1	7
Cymbush/Ripcord	–[b]	–[b]	–[b]
Decis	2	2	1
Diazinon	–[b]	–[b]	–[b]
Dibrom	1	1	–[b]
Dylox	2	2	0.5
ECObait	3	3	N/A
Endosulfan/Thiodan/ Thionex	2	1	2
Furadan 480F	1	1	5
Guthion/Sniper	1	1	5
Lannate	1	1	1.5
Lorsban/Nufos/Pyrinex	1	1	3.5
Malathion	2	1	2 (Honey Bee), 6 (Leafcutter Bee)
Matador	2	2	1
Monitor	1	1	1
Pirimor	2	2	0.5
Pounce	1	1	5
Sevin	1	1	7

TOXICITY RATING 1 = High 2 = Moderate 3 = Low

• Residue hazard represents the average time in days that residues poisonous to bees will remain on foliage. Most of this information has not been generated under western Canadian growing conditions and should be used only as a guideline.

[b] Information currently not available, although these products are known to be toxic to bees.

Resistance of Insects to Insecticides

Repeated use of the same or similar insecticides against a particular insect in a given area may result in the effectiveness of the insecticide being reduced. To retard or prevent resistance of insects to insecticides: use insecticides only when the economic threshold for a pest has been surpassed and natural controls fail to limit economic damage, and rotate between insecticides with different chemical structures, particularly if several applications are made in a season.

Insecticides can be classified according to their similarity in chemical structure (chemical family in the table below), and by mode of action (the process by which the insecticide kills the insect). By selecting products from different chemical families (i.e. with different chemical structures) for an insecticide rotation program, insecticide resistance can be prevented.

CHEMICAL FAMILY	TRADE NAME	COMMON NAME	MODE OF ENTRY
CARBAMATES	Sevin, Ecobait	carbaryl	contact/stomach
	Furadan	carbofuran	contact/systemic
	Lannate	methomyl	contact/stomach
	Pirimor	pirimicarb	contact vapour/systemic
ORGANOPHOSPHATES	Guthion, Sniper	azinphos-methyl	contact
	Cygon, Lagon, Hopper Stopper	dimethoate	contact/systemic
	Malathion, Fyfanon	malathion	contact
	Lorsban, Pyrinex	chlorpyrifos	contact/stomach/inhalation
	Monitor	methamidophos	contact/systemic
	Di-Syston	disulfoton	systemic
	Counter	terbufos	systemic
	Thimet	phorate	systemic
	Orthene	acephate	contact/stomach/systemic
	Diazinon	diazinon	contact/stomach
	Dylox	trichlorfon	contact/stomach
	Dibrom	naled	contact/stomach poison
	Imidan	phosmet	
	Parathion	parathion	contact/stomach/respiratory
ORGANOCHLORINES	Endosulfan, Thiodan Thionex	endosulfan	contact/stomach
	Lindane	gamma BHC	contact/stomach
	Methoxychlor	methoxychlor	contact/stomach
PYRETHROIDS	Cymbush, Ripcord	cypermethrin	contact/stomach
	Decis	deltamethrin	contact/stomach
	Ambush, Pounce	permethrin	contact/stomach
	Matador	cyhalothrin-lambda	contact/stomach
BIOLOGICALS	Dipel	*B.t.* ssp. kurstaki	stomach
Chloronicotinyls	Admire	imidacloprid	contact/stomach

Insecticide Selector Chart

ALFALFA

Alfalfa blotch leafminer	Alfalfa weevil	Aphids	Beet webworm	Blister beetle
Cygon Fyfanon Imidan Lagon	Decis Fyfanon Guthion Imidan Malathion Matador Methoxychlor Sniper	Cygon Dibrom Fyfanon Lagon Malathion Matador	Sevin	Sevin
Grasshoppers	**Leafhoppers**	**Lygus bugs**	**Sweet clover weevil**	**True armyworm**
Cygon ECObait Fyfanon Guthion Hopper Stopper Lagon Malathion Matador Methoxychlor Sevin Sniper	Cygon Dibrom Fyfanon Guthion Lagon Malathion Matador Methoxychlor Sevin Sniper	Cygon Decis Dibrom Dylox Fyfanon Guthion Lagon Malathion Matador Sniper	Cygon Guthion Methoxychlor Sniper	Methoxychlor Sevin

BARLEY

Aphids	Grasshoppers	Leafhoppers	Redbacked cutworm	Thrips	True armyworm	Wireworm
Di-Syston Fyfanon Lorsban Malathion Nufos Pyrinex	Decis ECObait Hopper Stopper Lagon Lorsban Malathion Matador Nufos Pyrinex Ripcord Sevin	Sevin	Ambush Decis Lorsban Nufos Pounce Pyrinex Ripcord	Cygon Lannate Lagon	Dylox Fyfanon Lannate Lorsban Malathion Methoxychlor Nufos Pyrinex Sevin	DB-Green L[*] NM Dual Purpose[*] Vitavax Dual Powder[*] Vitaflo Dual Purpose[*] Vitavax Dual Solution[*]

BEANS

Aphids	Grasshoppers	Leafhoppers	Lygus bugs	Seedcorn maggot	Thrips	Wireworm
Cygon Diazinon Dibrom Di-Syston Fyfanon Lagon Malathion Parathion Thimet Thiodan	ECObait Lagon	Cygon Di-Syston Fyfanon Lagon Malathion Methoxychlor Parathion Sevin Thimet Thiodan	Cygon Dylox Lagon Sevin Thimet	Diazinon Agrox B-3[*] Agrox D-L Plus[*]	Parathion Thimet	Agrox B-3[*] Agrox D-L Plus[*]

[*] Seed Treatment- see fungicide section of Guide to Crop Protection for label information.

CANARY SEED

Aphids
Cygon/Lagon Malathion

CANOLA

Aphids	Beet webworm	Bertha armyworm	Clover cutworm	Diamondback moth	Flea beetles	Grasshopper
Cygon Lagon	Decis Dylox Lannate	Cymbush Decis Lannate Lorsban Monitor Nufos Pyrinex Ripcord	Decis Lannate	Decis Dylox Fyfanon Lorsban Malathion Nufos Pyrinex	Counter 5G Cymbush Decis Furadan Fyfanon Gaucho canola system[1] Gaucho platinum[1] Malathion Matador Ripcord Sevin	Cygon ECObait Fyfanon Lagon Lorsban Malathion Matador Monitor Nufos Pyrinex Ripcord
Leafhoppers	**Lygus bugs**	**Redbacked cutworm**	**Red turnip beetle**	**Root Maggot**	**True armyworm**	
Cygon Lagon	Dylox Lorsban Matador Nufos Pyrinex	Ambush Lorsban Nufos Pounce Pyrinex	Furadan	Counter 5G	Lorsban Nufos Pyrinex	

CORN

Aphids	European corn borer	Grasshoppers	Redbacked cutworm	Seedcorn maggot	Thrips	True armyworm	Wireworm
Endosulfan Lannate Parathion Pirimor Thiodan	Ambush Cymbush Decis Furadan Fyfanon Lannate Matador Parathion Pounce Ripcord Sevin	ECObait Hopper Stopper Sevin	Ambush Dylox Lorsban Matador Nufos Pounce Pyrinex Ripcord	Agrox B-3[1] Agrox D-L plus[1] Diazinon Counter 15G	Parathion	Dylox Methoxychlor Parathion	Agrox B-3[1] Agrox D-L plus[1] Counter 15G

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[1] Seed Treatment- see fungicide section of Guide to Crop Protection for label information.

HAY

Grasshoppers
Hopper Stopper Lagon Malathion

HEADLANDS

Grasshoppers
Cygon ECObait Hopper Stopper Lagon Ripcord Sevin

FLAX

Aphids	Beet webworm	Bertha armyworm	Clover cutworm	Grasshoppers	Redbacked cutworm	True armyworm	Wireworms
Cygon Lagon	Decis Dylox	Dylox Lannate Lorsban Nufos Pyrinex	Decis	Decis Fyfanon Malathion Matador	Ambush Decis Lorsban Nufos Pounce Pyrinex	Dylox Lorsban Nufos	Vitavax dual powder[*]

LENTILS

Grasshoppers	Redbacked cutworm
Decis Fyfanon Lorsban Malathion Nufos Pyrinex	Ambush Decis Pounce

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[*] Seed Treatment- see fungicide section of Guide to Crop Protection for label information.

MUSTARD

Beet webworm	Bertha armyworm	Clover cutworm	Diamondback moth	Flea beetles	Grasshopper	Red turnip beetle	Root maggot
Decis	Decis Cymbush	Decis	Decis	Counter 5G Cymbush Decis Furadan Fyfanon Matador	Fyfanon Matador	Furadan	Counter 5G

OATS

Aphids	Grasshoppers	Redbacked cutworm	Thrips	True Armyworm	Wireworm
Di-Syston Fyfanon Malathion	Decis ECObait Hopper Stopper Lagon Lorsban Malathion Matador Nufos Pyrinex Sevin	Ambush Decis Lorsban Nufos Pounce Pyrinex	Cygon Lagon Lannate	Dylox Fyfanon Lannate Lorsban Malathion Methoxychlor Nufos Pyrinex Sevin	DB-Green L[s] NM dual purpose[s] Vitavax dual powder[s] Vitavax dual solution[s]

PASTURES

Grasshoppers
Cygon Decis Diazinon Dibrom ECObait Hopper Stopper Lagon Malathion Matador Sevin

PEAS

Aphids	Leafhoppers	Redbacked cutworm	Seedcorn maggot	Wireworm
Cygon Di-Syston Fyfanon Lagon Lannate Malathion Parathion Pirimor Thiodan	Fyfanon Malathion	Ambush Pounce	Agrox B-3[s] Agrox D-L Plus[s] Diazinon	Agrox B-3[s] Agrox D-L Plus[s]

[s] Seed Treatment- see fungicide section of Guide to Crop Protection for label information.

POTATOES

Aphids	Blister beetle	Colorado potato beetle	European corn borer	Flea beetles
Cygon Diazinon* Di-Syston Endosulfan Fyfanon Imidan* Lagon Lannate* Malathion Monitor Orthene** Pirimor** Thimet Thiodan	Methoxychlor*	Admire Ambush/Pounce Cymbush** Decis* Diazinon* Dibrom* Di-Syston Endosulfan Furadan Fyfanon Guthion Imidan* Lorsban* Malathion Matador* Methoxychlor* Monitor Nufos* Pyrinex* Ripcord** Sevin Sniper Thimet Thiodan	Guthion Sevin Sniper	Ambush/Pounce Cymbush** Decis* Diazinon* Dibrom* Di-Syston Endosulfan Furadan Guthion Imidan* Lannate* Lorsban* Matador* Methoxychlor* Monitor Nufos* Orthene** Pyrinex* Ripcord** Sevin Sniper Thimet Thiodan

Leafhoppers	Lygus bugs	Redbacked cutworm	Wireworm
Ambush/Pounce Cygon Cymbush** Diazinon* Dibrom* Di-Syston Decis* Endosulfan Furadan Fyfanon Guthion Imidan* Lagon Lannate* Matador* Malathion Methoxychlor* Monitor Orthene** Ripcord** Sevin Sniper Thimet Thiodan	Ambush/Pounce Cymbush** Decis* Endosulfan Furadan Guthion Lagon Lorsban* Matador* Nufos* Orthene** Pyrinex* Ripcord** Sevin Sniper Thiodan WP	Ambush/Pounce Lorsban* Nufos* Pyrinex* Ripcord**	Thimet

*Not an approved product by Midwest Food Products Inc.

** Not an approved product by Midwest Food Products Inc. and McCain Foods.

ROADSIDES

Grasshoppers
Cygon Decis Diazinon ECObait Hopper Stopper Lagon Lorsban Nufos Pyrinex Ripcord Sevin

RYE

Aphids	Grasshoppers	Redbacked cutworm	True armyworm	Wireworm
Fyfanon Malathion	ECObait Guthion Hopper Stopper Lagon Malathion Sevin Sniper	Ambush Pounce	Fyfanon Malathion Methoxychlor Sevin	DB-Green L[a] N-M dual purpose[a] Vitavax dual powder[a] Vitavax dual solution[a]

SUNFLOWERS

Sunflower beetle	Sunflower moth	Sunflower seed weevil	Redbacked cutworm
Cymbush Decis Furadan Matador Ripcord Thiodan	Dipel	Cymbush Lorsban Nufos Ripcord	Ambush Lorsban Nufos Pounce Pyrinex

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[a] Seed Treatment- see fungicide section of Guide to Crop Protection for label information.

SWEET CLOVER

Aphids	Alfalfa weevil	Beet webworm	Blister beetle	Grasshoppers
Cygon Dibrom	Methoxychlor	Sevin	Sevin	Guthion Hopper Stopper Lagon Malathion Methoxychlor Sevin Sniper

Leafhoppers	Lygus bugs	Sweet clover weevil	True armyworm
Cygon Dibrom Malathion Methoxychlor Sevin Sniper	Cygon Dibrom Guthion Sniper	Cygon Fyfanon Guthion Lagon Malathion Methoxychlor Sniper	Methoxychlor

TIMOTHY

European skipper
Dipel

WHEAT

Aphids	Grasshoppers	Hessian fly	Redbacked cutworm
Fyfanon Lagon Lorsban Malathion Nufos Pyrinex	Decis ECObait Hopper Stopper Lagon Lorsban Malathion Matador Nufos Pyrinex Ripcord Sevin	Di-Syston 15G (winter wheat only)	Ambush Decis Lorsban Nufos Pounce Pyrinex Ripcord

Thrips	True armyworm	Wheat midge	Wireworm
Cygon Lagon Lannate	Dylox Fyfanon Lannate Lorsban Malathion Methoxychlor Nufos Pyrinex Sevin	Cygon Lagon Lorsban Nufos Pyrinex	DB-Green L[1] NM dual purpose[1] Vitavax dual powder[1] Vitaflo dual purpose[1] Vitavax dual solution[1]

[1] Seed Treatment- see fungicide section of Guide to Crop Protection for label information.

Insecticide Directory

Admire

Company:

Bayer Inc.

Formulation:

240 g/L imidacloprid formulated as a flowable

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Colorado potato beetle

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Colorado potato beetle	Foliar application: 0.08 L / acre	$19.59	7 days
	Soil Application: 7.5 to 12 ml / 100 m row or 0.344 – 0.526 L/acre based on 90 cm row spacing	$84.25 - $128.80/acre	

Application:

Do not apply by aerial application.

Soil application: For best results, direct spray on the seed pieces or seed potatoes in the furrow. The higher rate is recommended when extended length of control is needed. Do not follow a soil application with a foliar application.

Foliar application: A maximum of two foliar applications of Admire may be made per season.

How it Works:

Admire is a systemic, chloronicotinyl insecticide.

Restrictions:

Do not apply within 15 meters of well-heads or aquatic systems, including marshes, ponds, ditches, streams, lakes, etc. Do not apply through any type of irrigation system.

Precautions:

Do not re-enter treated areas for 24 hours after foliar application of Admire. Admire is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Highly toxic to aquatic invertebrates and birds.

Hazard Rating:

Caution Poison

Ambush/Pounce

Company:

Ambush - Syngenta

Pounce - United Agri Products

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

Formulations:

Ambush - 500 g/L permethrin formulated as an emulsifiable concentrate. Container size - 1 L (6 x 1L).

Pounce - 384 g/L permethrin formulated as an emulsifiable concentrate. Container size - 1 L (12 x 1L).

Insects Controlled and Registered Crops:

CROP	INSECT
Cereals, canola, corn, flax, lentils, peas, potatoes, sunflowers,	Redbacked cutworm, Pale Western cutworm European corn borer, corn earworm, Fall armyworm
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug, variegated cutworm

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Redbacked cutworm (Ambush) (Pounce)	0.06 - 0.12 L/acre 0.075 - 0.158 L/acre	$6.58 - $13.16/acre $7.50 - $15.80/acre	Treat prior to 6-leaf stage
Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug (Ambush) (Pounce)	0.06 - 0.08 L/acre 0.075 - 0.10 L/acre	$6.58 - $8.78/acre $7.50 - $10.00/acre	1 day 1 day
Variegated cutworm (Ambush) (Pounce)	0.06 L/acre 0.075 L/acre	$6.58/acre $7.50/acre	1 day
European corn borer, corn earworm (Ambush) (Pounce)	0.08 - 0.11 L/acre 0.11 - 0.15 L/acre	$8.78 - $12.07/acre $11.00 - $15.00/acre	1 day
Fall Armyworm Ambush) (Pounce)	0.06 L/acre 0.073 L/acre	$6.58/acre $7.30/acre	1 day

Application:

Apply Ambush for cutworm control by ground only. Foliar potato pests may be controlled by air or ground. Apply Pounce by ground only. Apply when insects exceed economic threshold numbers and use sufficient water for good coverage. Use higher rates for heavy infestations, adult insects and dense foliage. For cutworm control application should be made under warm, moist conditions in the evening or at night. Use high rates if larvae are near maturity or soil conditions are dry. Do not disturb soil surface for five days after treatment.

How it Works:

A synthetic pyrethroid insecticide. It is a stomach and contact insecticide with no systemic or fumigant effects.

Restrictions:

Grazing: Cover crops or crops treated with Ambush/Pounce should not be used as a green feed for animals.

Storage: Store above 0°C.

Others: Observe a 16 yard (15 m) setback distance for ground and 110 yard (100 m) setback distance by air near water bodies or other sensitive areas.

Precautions:

Ambush/Pounce are of low acute mammalian toxicity. Both are very toxic to bees and fish. Do not contaminate ponds, lakes or streams while filling sprayer or spraying. Avoid spraying when bees are foraging.

Hazard Rating:

Caution Poison

Counter 5G/Counter 15G

Company:

BASF

Formulations:

5 percent and 15 percent terbufos formulated as a granular.

Container sizes - 20 kg (5 percent); 20 kg (15 percent).

Insects Controlled and Registered Crops:

CROP	INSECT
Canola, mustard (Counter 5G)	Flea beetles, cabbage root maggot suppression
Field corn, sweet corn (Counter 15G)	Wireworm, seed corn maggot

Rates and Costs:

INSECT	RATE	COST
Flea beetle (Counter 5G)	2.2 - 4.5 kg/acre	$7.48 - $15.30/acre
Root maggots (Counter 5G)	2.2 - 4.5 kg/acre	$7.48 - $15.30/acre
Seed corn maggot, wireworms (Counter 15G)	0.075 kg/110 yard (100 m) row (minimum 2.5 feet (75 cm) row spacing)	$0.38/110 yard (100 m) row (minimum 2.5 feet (75 cm) row spacing)

Application:

For control of flea beetles or suppression of root maggots in canola and mustard at planting time, blend seed and granules in a mechanical mixer or stir with a stick in the drill box. Mix 2.2-4.5 kg Counter 5G with enough seed to sow 1 acre. Adjust the flow rate to sow the combined weight of seed and Counter 5G.

Example: If 2.2 kg of seed per acre is to be sown, mix with 2.2 kg of Counter 5G, adjusting seeding rate to sow 4.4 kg per acre.

To reduce root maggot feeding damage in canola, mix 2.2 to 4.5 kg Counter 5G with enough seed to sow 1 acre. Adjust the flow rate to sow the combined weight of seed and Counter 5G.

For control of seed corn maggot and wireworms in corn, place granules in a 7 inch (18 cm) band over the row directly behind planter shoe or place directly into the seed furrow behind the planter shoe. Works as a systemic poison with good initial and residual activity.

Use higher rates of Counter 5G when extreme infestations of flea beetles or root maggots are anticipated.

Counter 5G can be effectively used with air seeders provided that the seed is placed in rows. If the seed emerges in rows then Counter 5G will continue to be effective. When the seed is widely distributed with a broadcast boot under a wide sweep, Counter 5G will not provide adequate control.

Counter 5G may be mixed with fungicide treated seed.

How it Works:

Counter is a systemic, organophosphorous insecticide with effective initial and residual activity.

Restrictions:

Storage: Store away from food and feed. Store open bags in labelled sealed drums or heavy plastic bags.

Others: Treated seed must not be used for feed or oil processing. Excess treated seed should be used up by double planting.

Do not reuse the bag. Completely empty the bag, make the empty bag unsuitable for further use, dispose of bag in accordance with provincial requirements.

Precautions:

Counter has a high acute mammalian toxicity. Very highly toxic to birds, fish and other wildlife. Rapidly absorbed through skin. Repeated inhalation or skin contact may, without symptoms, progressively increase susceptibility to poisoning. Do not get in eyes, on skin or clothing. Do not handle with bare hands. Do not breathe in dust. Do not contaminate food or feed products. Wear freshly laundered, long-sleeved work clothing daily. Wear rubber gloves with sleeve cuffs covering the gloves.

Hazard Rating:

Danger Poison

Cygon/Lagon/Hopper Stopper

Company:

Hopper Stopper - Peacock Industries

Cygon - IPCO, Cheminova

Lagon - United Agri Products

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

Formulations:

Cygon/Lagon - 480 g/L dimethoate formulated as an emulsifiable concentrate. Container size - 10 L.

Hopper Stopper - 5.2 percent dimethoate formulated as a bran bait. Container size - 20 kg.

Insects Controlled and Registered Crops:

CROP	INSECT
Beans	Aphids, grasshoppers, leafhoppers, lygus bugs
Potatoes	Aphids, leafhoppers
Alfalfa	Alfalfa blotch leafminer, aphids, grasshoppers, leafhoppers, lygus bug, plant bug, sweet clover weevil
Canary seed	Aphids
Canola	Aphids, grasshoppers, leafhoppers
Pastures, wasteland, forages	Grasshoppers
Wheat	Orange wheat blossom midge, thrips, grasshoppers, Russian wheat aphid
Flax	Aphids
Sweet clover	Sweet clover weevil
Peas	Aphids
Barley, oats	Aphids, grasshoppers, thrips
Rye	Grasshoppers

Rate, Costs, Preharvest Intervals:

Cygon 4-E (IPCO), Cygon 480 (Cheminova)

INSECT	RATE	COST	PREHARVEST INTERVAL
Aphids (alfalfa)	0.17 L/acre	$3.87/acre	2 days
Aphids (beans)	0.28 - 0.40 L/acre	$6.37 - $9.10/acre	7 days
Aphids (canary seed)*	0.20 L/acre	$4.55/acre	21 days
Aphids (canola)*	0.34 - 0.36 L/acre	$7.74 - $8.19/acre	21 days
Aphids (peas)	0.11 - 0.17 L/acre	$2.50 - $3.87/acre	3 days
Aphids (potatoes)	0.22 - 0.44 L/acre	$5.01 - $10.01/acre	7 days
Aphids (wheat, oats, barley)*	0.17 L/acre	$3.87/acre	21 days
Potato aphid (flax)*	0.18 L/acre	$4.10/acre	21 days
Leafhoppers (alfalfa)	0.17 L/acre	$3.87/acre	2 days
Leafhoppers (beans)	0.28 - 0.40 L/acre	$6.37 - $9.10/acre	7 days
Leafhoppers (canola)*	0.34 - 0.36 L/acre	$7.74 - $8.19/acre	21 days
Leafhoppers (potatoes)	0.22 - 0.44 L/acre	$5.01 - $10.01/acre	7 days
Grasshoppers (alfalfa, pasture, wasteland)	0.17 - 0.34 L/acre	$3.87 - $7.74/acre	2 - 7 days
Grasshoppers (canola)*	0.34 - 0.36 L/acre	$7.74 - $8.19/acre	21 days
Sweet clover weevil (sweet clover, alfalfa**)	0.34 - 0.44 L/acre	$7.74 - $10.01/acre	28 days
Lygus bugs, plant bugs** (alfalfa)	0.17 L/acre	$3.87/acre	2 days
Lygus bugs, plant bugs (alfalfa seed production)*	0.44 L/acre	$10.01/acre	28 days
Lygus bugs (beans)	0.28 - 0.40 L/acre	$6.37 - $9.10/acre	7 days
Alfalfa blotch leafminer*	0.22 L/acre	$5.01/acre	2 days
Wheat midge*	0.40 L/acre	$9.10/acre	21 days
Thrips (wheat, oats, barley)*	0.40 L/acre	$9.10/acre	21 days

*Cygon 480 only
**Cygon 4-E only

Lagon 480E (United Agri Products)

INSECT	RATE	COST	PREHARVEST INTERVAL
Aphids (beans)	0.28 - 0.40 L/acre	$6.37 - $9.10/acre	7 days
Aphids (canola)	0.34 - 0.36 L/acre	$7.74 - $8.19/acre	21 days
Aphids (canaryseed)	0.20 L/acre	$4.55/acre	21 days
Aphids (alfalfa)	0.17 L/acre	$3.87/acre	2 days
Aphids (peas)	0.11 - 0.17 L/acre	$2.50 - $3.87/acre	3 days
Aphids (potato)	0.22 - 0.44 L/acre	$5.00 - $10.01/acre	7 days
Potato aphids (flax)	0.17 L/acre	$3.87/acre	21 days
Russian wheat aphid	0.40 L /acre	$9.10/acre	21 days
Grasshopper (alfalfa)	0.22 - 0.36 L/acre	$5.00 - $8.19/acre	2 - 7 days
Grasshopper (beans)	0.28 - 0.40 L/acre	$6.37 - $9.10/acre	7 days
Grasshopper (canola)	0.34 - 0.36 L/acre	$7.74 - $8.19/acre	21 days
Grasshopper (forages)	0.17 - 0.40 L/acre	$3.87 - $9.10/acre	2 - 28 days
Grasshopper (pasture, wasteland)	0.22 - 0.40 L/acre	$5.00 - $9.10/acre	2 - 28 days
Grasshopper (barley, oats, wheat, rye)	0.22 - 0.40 L/acre	$5.00 - $9.10/acre	2 days
Grasshopper (safflower)	0.22 - 0.40 L/acre	$5.00 - $9.10/acre	21 days
Alfalfa blotch leafminer	0.22 L/acre	$5.00 / acre	2 days
Leafhoppers (potato)	0.22 - 0.44 L/acre	$5.00 - $10.01/acre	7 days
Leafhoppers (canola)	0.34 - 0.36 L/acre	$7.74 - $8.19/acre	21 days
Lygus bugs, plant bugs (alfalfa seed)	0.44 L/acre	$10.01/acre	28 days
Orange wheat blossom midge (wheat)	0.40 L/acre	$9.10/acre	21 days
Say stinkbugs (barley, oats, wheat, rye)	0.22 - 0.40 L/acre	$5.00 - $9.10/acre	2 days
Sweet clover weevil	0.34 - 0.44 L/acre	$7.74 - $10.01/acre	28 days
Thrips (barley, oats, wheat)	0.40 L/acre	$9.10/acre	7 days

Application:

May be applied by air or ground equipment. Apply when insects exceed economic threshold numbers and use sufficient water for good coverage. Use higher rates for adult insects, heavy infestations or dense canopy.

How it works:

Broad spectrum, systemic and contact, organophosphate insecticide and acaricide.

Restrictions:

Grazing: Remove cattle prior to spraying. Read label carefully to determine livestock reentry period.

Storage: Store at temperatures between 4°C and 30°C and in areas away from feed and food.

Others: Do not treat when bees are foraging. Do not apply to alfalfa in bloom. Read label carefully to determine maximum number of applications per season. Wait at least 10 days before placing leafcutter bees in treated fields.

Precautions:

Dimethoate is of high acute mammalian toxicity and is highly toxic to birds, bees and other animals. Wear a respirator, goggles, rubber gloves, rubber boots and coveralls when handling concentrate. Avoid contact with skin and eyes. Do not inhale spray mist.

Hopper Stopper Bran Bait (Peacock Industries):

For the control of grasshoppers on pastures, roadsides, forages, cereal crops, and waste areas. For ground or aerial broadcast application.

Apply evenly to control grasshoppers at the rate of 0.8 to 1.2 kg/acre.

When applied as directed will not harm pollinators. May be used on pastures without removing beef cattle. Dairy cattle should be removed for 48 hours. Leave a 21 day interval between last application and harvest of grain.

Hazard Rating:

Warning Poison - Lagon
Caution Poison - Hopper Stopper
Danger Poison - Cygon

Cymbush

Company:

Syngenta

Formulations:

250 g/L cypermethrin formulated as an emulsifiable concentrate.

Container size - 1L jugs.

Insects Controlled and Registered Crops:

CROP	INSECT
Canola, mustard	Flea beetle, bertha armyworm
Corn	European corn borer
Potatoes	Colorado potato beetle, potato flea beetle, potato leaf hopper, tarnished plant bug
Sunflowers	Sunflower beetle, sunflower seed weevil

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Flea beetle (canola, mustard)	0.055 L/acre	$3.71/acre	30 days
Flea beetle (potato)	0.055 L/acre	$3.71/acre	7 days
Bertha armyworm	0.08 - 0.113 L/acre	$5.40 - $7.63/acre	30 days
Colorado potato beetle	0.055 L/acre	$3.71/acre	7 days
European corn borer	0.113 L/acre	$7.63/acre	5 days
Potato leafhopper	0.055 L/acre	$3.71/acre	7 days
Tarnished plant bug	0.08 L/acre	$5.40/acre	7 days
Sunflower beetle, sunflower seed weevil	0.04 L/acre	$2.70/acre	70 days

Application:

May be applied by air or ground equipment, except mustard (ground application only). Apply when insects exceed economic thresholds and use sufficient water for good coverage. Refer to product label for maximum number of ground and aerial applications allowed.

How it Works:

Works as a contact and stomach poison with good residual activity. No systemic or fumigant activity.

Effects of Weather:

Avoid application when temperatures exceed 27°C.

Restrictions:

Grazing: Cover crop or crop treated with Cymbush must not be used as a green feed for animals except as noted for corn, rutabagas, and turnips.

Storage: Store in a cool, dry, well ventilated area away from foodstuffs. This product is not affected by freezing.

Others: Observe a 16 yard (15 m) buffer zone from water bodies by ground application and a 110 yard (100 m) buffer zone from water bodies when applied by air.

Precautions:

Cymbush is of low to moderate mammalian toxicity and is very toxic to bees and fish. Harmful or fatal if swallowed or absorbed through the skin. Causes eye and skin irritation and skin sensitization. Wear long-sleeved clothing and rubber gloves when handling or spraying. Wear face shield or eye goggles when mixing. Do not contaminate ponds, lakes or streams during sprayer filling or while spraying. Avoid spraying when bees are foraging.

Hazard Rating:

Warning Poison

Decis

Company:

Aventis CropScience

Formulations:

50 g/L deltamethrin formulated as an emulsifiable concentrate and as a flowable.

Container sizes: Decis 5EC - 2.5 L and 2 L jugs;

Decis 5F - 3 L jugs.

Application:

Decis may be applied by air or ground equipment to all crops with the exception of alfalfa and corn, which require ground application only. Apply when insects exceed economic threshold numbers with sufficient water for good coverage.

Use higher rates for severe infestations, on dense foliage or when a number of insect growth stages are present. Works as contact and stomach poison usually with very quick results.

Tank Mixes:

May be tank mixed with the following herbicides:

Hoe-Grass 284 (5 EC only)
Pardner
Banvel
2,4-D
Achieve (Decis 5F only)
Hoe-Grass II (5 EC only)
Buctril M
MCPA
Stampede EDF

How it Works:

A non-systemic, synthetic pyrethroid which works by contact and ingestion.

Effects of Weather:

Do not spray under a strong temperature inversion, or when temperature exceeds 25°C. Do not apply within 1 hour of rain.

Restrictions:

Grazing: Do not feed treated alfalfa to beef cattle within 90 days of harvest. Do not allow beef cattle to graze treated cereals, flax, lentils, pasture or rangeland within 1 day of application. Dairy cattle must not be fed or grazed on Decis treated crops.

Storage: Do not store below freezing. Do not store near feed, food, seeds or fertilizer. Keep away from heat, sparks and open flames. If stored for 1 year or longer, shake well before using.

Others: Observe a 16 yard (15 m) buffer zone from environmentally sensitive areas (for example, wetlands, sloughs, rivers, houses, farm buildings) when applying by ground equipment and a 110 yard (100 m) buffer zone when applied by air. The number of aerial applications permitted varies with crop. Consult container label. In soils with high organic content (muck soils), Decis 5 EC should be applied only once per season, prior to August 1, and at rates of no more than 80 mL/acre.

Insects Controlled and Registered Crops:

DECIS 5EC

CROPS	INSECT
Alfalfa (seed crops only)	Lygus bug, alfalfa weevil
Field corn	European corn borer
Potatoes	Colorado potato beetle, potato flea beetle, tarnished plant bug, leafhopper
Canola, mustard	Flea beetle, clover cutworm, bertha armyworm, diamondback moth, beet webworm
Sunflowers	Sunflower beetle
Wheat, barley, oats, lentils, flax	Cutworms, grasshoppers

DECIS 5EC cont'd

CROPS	INSECT
Rangeland, pastures, roadside, fence row	Grasshoppers
Flax	Cutworms, beet webworm

DECIS 5F

CROPS	INSECT
Canola	Flea beetle
Wheat, barley, oats, flax, lentils	Grasshoppers
Rangeland, pastures, roadsides	Grasshoppers

Rates, Costs, Preharvest Intervals:

DECIS 5EC

INSECT	RATE	COST	PREHARVEST INTERVAL
Alfalfa weevil, lygus bug (alfalfa)	0.08 - 0.1 L/acre	$6.72 - $8.40/acre	20 days
Cutworms (see above)	0.08 L/acre	$6.72/acre	30 days (lentils), 31 days (oats) 40 days (flax, wheat, barley)
Grasshoppers (see above)	0.04 - 0.06 L/acre (ground) 0.06 L/acre (air)	$3.36 - $5.04/acre	30 days (lentils), 31 days (oats) 40 days (flax, wheat, barley) 1 day (rangeland pastures, roadsides, fence row)
Bertha armyworm, clover cutworm, diamondback moth, flea beetles, beet webworm (canola)	0.04 - 0.06 L/acre	$3.36 - $5.04/acre	14 days (Canola, mustard)
Colorado potato beetle, potato flea beetle, tarnished plant bug, leafhoppers (potatoes)	0.04 - 0.06 L/acre	$3.36 - $5.04/acre	3 days
Sunflower beetle (sunflower)	0.04 L/acre	$3.36/acre	70 days
European corn borer (corn)	0.1 - 0.12 L/acre	$8.40 - $10.08/acre	Maximum 3 applications per year
Beet webworm (flax)	0.04 - 0.06 L/acre	$3.36 - $5.04/acre	40 days

DECIS 5F

INSECT	RATE	COST	PREHARVEST INTERVAL
Flea beetle (canola)	0.04 - 0.06 L/acre	$4.20 - $6.30/acre	14 days
Grasshoppers (see above)	0.032 - 0.048 L/acre (ground) 0.048 L/acre (air)	$3.36 - $5.04/acre	1 day (pastures) 30 days (lentils) 31 days (oats) 40 days (wheat, barley, flax)

Precautions:

Decis is of high mammalian toxicity and is a severe eye and skin irritant. Avoid contacting or breathing spray mist. Very toxic to aquatic organisms and fish. Toxic to bees. Avoid spraying when bees are foraging.

Wear protective clothing, including goggles and respirator, when handling or spraying. Do not contaminate or store near feed or foodstuffs. Wash thoroughly after using Decis.

Hazard Rating:

Danger Poison

Diazinon

Company:

United Agri Products (500E, 50W)
IPCO (500 EC)

Formulations:

Diazinon 500E – 50% diazinon formulated as a liquid. Container size: 4 L, 10L

Diazinon 500 EC – 500 g/L diazinon formulated as an emulsifiable concentrate. Container size: 4 L, 10 L.

Diazinon 50W – 50 % diazinon formulated as a wettable powder. Container size: 2 kg

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	Aphids, flea beetles, Colorado potato beetles, leafhoppers
Corn, peas, beans	Seedcorn maggot
Beans (field)	Aphids
Rangeland, pasture, ditch banks, roadsides, fence rows, wasteland.	Grasshoppers

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Aphids (potatoes), flea beetles, Colorado potato beetle, leafhoppers (potatoes)	0.445 L/acre (Diazinon 500E and 500 EC) 0.445 kg/acre (Diazinon 50W)	$6.45/acre $8.19/acre	14 14
Seedcorn maggot	20g/300 ml water / 4 L seed (Diazinon 50W)	N/A	N/A
Aphids (beans)	0.445 L/acre (Diazinon 500E and 500 EC)	$6.45/acre	3 (Diazinon 500E) 7 (Diazinon 500 EC)
Grasshoppers	0.445 L/acre (Diazinon 500 E and 500 EC) 0.445 kg/acre (Diazinon 50W)	$6.45/acre $8.19/acre	Do not spray livestock directly. Dairy and beef cattle and sheep may be grazed or fed green forage immediately following application. Hay may be fed if not cut for 21 days following application.

Application:

Apply Diazinon 50W by ground only.

How it Works:

Diazinon is an organophosphate insecticide with systemic and contact activity.

Effects of Weather:

Diazinon 500E and 50W work most effectively if the temperature is 20°C or more or when temperatures will reach or exceed this minimum.

Restrictions:

Beneficial insects: Avoid spraying open flowers. Highly toxic to bees exposed to direct treatment or to residues on crops.

Environment: Do not contaminate any body of water, waterway or water source. Toxic to birds, fish, and wildlife, including waterfowl.

Precautions:

May be fatal if swallowed. Avoid contact with skin and inhalation of spray mist. Wear an approved respirator. Wash thoroughly after handling and before eating, drinking and smoking.

Hazard Rating:

Danger Poison

Dibrom

Company:

United Agri Products

Formulations:

864 g/L naled formulated as an emulsifiable concentrate.

Container size – 4 x 3.78 L jugs per case.

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa, Clover, Vetch	Aphids, loopers, leafhoppers, Lygus bugs
Potatoes	Flea beetles, Colorado potato beetles, leafhoppers
Rangeland, field areas and pastures.	Grasshoppers

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Flea beetles, Colorado potato beetle, leafhoppers (potatoes)	0.44 L/acre	$ 16.77/acre	4
Aphids, loopers, leafhoppers, Lygus bugs (alfalfa, clover, vetch)	0.44 - 0.88 L/acre	$16.77 - 33.54/acre	4
Grasshoppers			
(young)	0.22 - .34 L/acre	$ 8.38 - $12.96/acre	4
(adults)	0.28 - 0.4 L/acre	$ 10.67 - $15.24/acre	

Application:

Apply Dibrom by ground or air. Use designated amounts in full volumes of water. For ground application use 100 – 300 L of water per hectare. For aerial use 11 – 22 L of water per hectare unless otherwise stated.

How it Works:

Dibrom is an organophosphate insecticide. It acts as a contact and stomach poison.

Effects of Weather:

Do not apply Dibrom when air temperature is greater than 32°C.

Restrictions:

Environment: Do not contaminate any body of water, waterway or water source. Dibrom is highly to moderately toxic to birds, aquatic animals and other wildlife.

Precautions:

Concentrate may cause skin damage. Do not get on skin, eyes or clothing. Use waterproof gloves and face shield or goggles when handling concentrate. Harmful if swallowed. Avoid breathing spray mist.

Avoid contamination of feed, foodstuffs and drinking water.

Highly toxic to bees, avoid application during periods of bee activity.

Hazard Rating:

Danger Poison

Dipel 2X DF

Company:
Valent BioSciences

Formulation:
32 BIU/kg of *Bacillus thuringiensis* subsp. *Kurstaki*

Insects Controlled and Registered Crops:

CROP	INSECT
Sunflower	Sunflower moth
Timothy	Essex (European) skipper

Rates and Costs:

INSECT	RATE	COST
Sunflower moth	127.5 - 252.9 g/acre in a minimum of 20 L of water (aerially applied)	$11.79 - $23.58/acre
Essex (European) skipper	56.7 - 111.3 g/acre	$5.19 - $5.66/acre

Application:
Treat when larvae are young (early instars) before the crop is damaged. A spreader sticker such as Triton B1956 should be used to give thorough foliage coverage.

How it Works:
A biological stomach insecticide resulting in the larvae ceasing to eat in a few hours, with death usually occurring within 1-3 days.

Restrictions:
Storage: Store at temperatures between 0° and 25°C (cooler temperatures preferable).

Others: Do not allow dilute spray to stand in tank for more than 12 hours. Use product within 24 months of date of manufacture if stored at cool temperatures. Final spray solution for Bt should have a pH of 5 - 7.

Precautions:
Harmful if swallowed, inhaled, or absorbed through the skin. Avoid breathing dust or spray mist. Avoid contact with skin, eyes, or clothing. In case of contact with eyes or skin, immediately flush eyes or skin with plenty of water.

Hazard Rating:
Caution Poison

Di-Syston

Company:

Bayer Inc.

Formulations:

15 percent disulfoton formulated as a granular. Container size - 20 kg bag.

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	Aphids, Colorado potato beetle, leafhoppers, potato flea beetle
Wheat (fall)	Hessian fly
Beans, peas	Aphids, leafhoppers
Barley, oats	Aphids, mites

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Aphids, Colorado potato beetle, leafhoppers, potato flea beetle	150-200 g/110 yard (100 m) row (Di-Syston 15 G)	$34.50 - $46.00/acre	90 days
Hessian fly	3.04 kg/acre	$20.55/acre	Apply at planting time in the fall
Aphids, leafhoppers (beans) Aphids, leafhoppers (peas) Aphids, mites (barley, oats)	3.0 - 6.1 kg/acre 3.0 - 7.1 kg/acre 3.04 kg/acre	$20.28 - $41.24/acre $20.28 - $48.00/acre $20.55/acre	60 days 50 days 60 days

Application:

Place granules in the seed furrow or in a band on each side of the seed furrow at planting. Application may also be made as a side dressing, either above or with fertilizer after plants become established. Use higher rates in organic soils.

On row crops when row spacing is extremely narrow, do not place Di-Syston treated areas (band or furrow) closer together than 15 centimetres.

How it works:

Di-Syston is a systemic insecticide that enters the plant through the root system. When placed near the root, Di-Syston is picked up and moves in the sap stream to all parts of the plant where it kills insects as they feed on the plant.

Restrictions:

Storage: Store away from food or feed.

Precautions:

Di-Syston is of high acute mammalian toxicity and poisonous if swallowed, inhaled or absorbed through skin. Rapidly absorbed through skin. Wear protective clothing, rubber gloves and goggles. Wear an approved respirator. Do not get in eyes or on skin. Do not breathe fumes or spray mist. Keep all unprotected persons out of the treatment area.

Hazard Rating:

Danger Poison

Dylox

Company:

Bayer Inc.

Formulations:

420 g/L trichlorfon formulated as a liquid.

Container size - 10 L container.

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa	Alfalfa caterpillar, alfalfa webworm, beet army worm, variegated cut worm, lygus bugs, stink bugs, tarnished plant bugs.
Barley, flax, oats, wheat	Armyworm (true), western yellow-striped armyworm, beet webworm, variegated cutworm, bertha armyworm
Beans (dry, Lima, and snap)	Armyworms, imported cabbageworm, dipterous leaf miners, lygus bugs, Mexican bean beetles, stink bug, variegated cutworm
Corn (field, sweet)	Armyworms, cutworms
Canola	Beet webworm, diamond back moth, lygus bug

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Alfalfa caterpillar	0.40 - 0.91 L/acre	$6.70 - $15.24/acre	14 days
Alfalfa webworm	0.28 - 1.11 L/acre	$4.69 - $18.59/acre	14 days
Beet armyworm, variegated cutworm (alfalfa)	0.61 - 1.11 L/acre	$10.22 - $18.59/acre	14 days
Lygus bugs, stink bugs, tarnished plant bug (alfalfa)	1.11 L/acre	$18.59/acre	14 days
Armyworm (true), western yellow-stripped armyworm (barley, flax, oats, wheat)	0.61 L/acre	$10.22/acre	21 days

INSECT	RATE	COST	PREHARVEST INTERVAL
Beet webworm, variegated cutworm (barley, flax, oats, wheat)	0.61 - 1.11 L/acre	$10.22 - $18.59/acre	21 days
Bertha armyworm	1.11 L/acre	$18.59/acre	21 days
Armyworms, cutworms (field and sweet corn)	0.61 - 1.11 L/acre	$10.22 - $18.59/acre	1 day
Armyworms, imported cabbageworm , dipterous leaf miners, lygus bugs, stink bug, variegated cutworm (beans)	1.11 - 1.62 L/acre	$18.59 - $27.14/acre	14 days (snap and dry beans) Do not apply to Lima beans after pod set
Beet webworm (canola)	0.61 L/acre	$10.22/acre	21 days
Diamondback moth (canola)	1.11 L/acre	$18.59/acre	21 days
Lygus bug (canola)	0.55 L/acre	$9.21/acre	21 days

Application:

May be applied by air or ground equipment. Works as a contact or stomach poison. Apply when insects exceed economic threshold levels and use sufficient water for good coverage.

How it Works:

Dylox is an organophosphate insecticide that works as a contact or stomach poison.

Effects of Weather:

Do not apply to alfalfa 48 hours before or after a period when the temperature drops below 5°C or a frost occurs. Under these conditions leaf burn resulting in yield loss may occur.

Restrictions:

Storage: Do not store below 0°C. Keep in cool, dry place. Keep away from heat and open flame.

Others: Do not apply to flax after flowering. Do not contaminate streams, lakes or ponds. May cause spotting of car paint. Wash car immediately if accidental exposure occurs.

Precautions:

Dylox is of high acute mammalian toxicity and can cause eye irritation. Dylox is toxic to bees. May be harmful if swallowed, inhaled or absorbed through the skin. Avoid contact with eyes or skin. Do not breathe vapours. Wash thoroughly with soap and water after handling.

Hazard Rating:

Danger Poison

ECObait

Company:

Peacock Industries

Formulation:

Wheat bran infused with carbaryl insecticide

Container size – 20 kg bag

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa, clover, corn (field and sweet), beans, oats, rye, wheat, barley, canola, pastures, rangelands, forage grasses, field borders, headlands, rights-of-way, roadsides, wastelands.	Grasshoppers

Preharvest Intervals and Livestock Re-entry Periods:

Crop	Preharvest Interval / Livestock re-entry period
Corn (field and sweet)	1
Alfalfa, clover	2
Beans	5
Oats, rye, wheat	14
Barley	28
Canola	Treat only seedlings
Field borders, headlands, rights-of-way, roadsides, wastelands	0
Entry of beef cattle or other livestock to pastures, rangelands or forage grasses	1
Entry of dairy cattle to pastures or rangelands, harvest of forage crops	2

Rate:

Apply 0.8 - 1.6 kg bait / acre broadcast evenly over the area to be treated. The higher rate should be used for older grasshoppers or severe infestations, or in all instances of thick crop canopy.

Cost:

$2.60 - $5.20/acre.

Application:

For ground application only. Do not apply by air.

Restrictions:

Do not apply within 50 meters of sloughs, ponds, streams, dugouts or open water. Apply when winds are between 3-8 kph and do not favor drift.

Presence of product on flowering crops such as alfalfa and clover will not harm foraging honey or leafcutter bees.

May be used in pastures while beef cattle are grazing.

Precautions:

Harmful if inhaled or swallowed. Avoid breathing dust or vapour from bait. Use only in well ventilated areas. May cause eye irritation. Avoid contact with eyes and skin. Wash thoroughly after handling and before eating or smoking. Avoid contamination of feed and foodstuffs. Keep away from heat, sparks and open flame.

Endosulfan/Thiodan/Thionex

Company:

Endosulfan - United Agri Products

Thiodan - Aventis CropScience

Thionex - Makhteshim - Agan of North America Inc. (distributed by United Agri Products)

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

Formulation:

Thiodan/Thionex - 400 g/L endosulfan formulated as an emulsifiable concentrate. Container size - 10 L

Endosulfan - 50% endosulfan formulated as a wettable powder. Container size - 1 kg.

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Aphid, Colorado potato beetle, flea beetle, leafhopper
Sunflower	Sunflower beetle
Beans	Aphids, potato leafhoppers

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Aphid, Colorado potato beetle, flea beetle, leafhopper, tarnished plant bug (potatoes)	0.6 - 0.8 L/acre (Thiodan) 0.45 - 0.61 kg/acre (Endosulfan) 0.6 - 0.8 L/acre (Thionex)	$8.37 - $11.16/acre $10.13 - $13.73/acre $8.70 - $11.60/acre	1 day
Sunflower beetle (sunflower)	0.6 L/acre (Thiodan) 0.6 L/acre (Thionex)	$8.37/acre $8.70/acre	60 days
Aphids, potato leafhoppers (beans)	0.6 - 1.0 L/acre (Thiodan) 0.6 - 1.0 L/acre (Thionex)	$8.37 - $13.95/acre $8.70 - $14.50/acre	2 days

Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage.

How it Works:

Organochlorine insecticides that work as contact and stomach poisons.

Tank Mixes:

Compatible with most commonly used insecticides and fungicides, except Bordeaux mixture and hydrated lime.

Restrictions:

Grazing: Do not feed treated crop residue to livestock.

Storage: Do not store below freezing. If stored one year or longer, shake well before using.

Others: On sunflowers, do not make more than 1 application per season.

Precautions:

Thiodan/Endosulfan/Thionex is of high, acute mammalian toxicity and is toxic to bees. Highly toxic to fish. Hazardous if swallowed, inhaled or absorbed through the skin. Wear synthetic rubber gloves and approved respirator in prolonged spray-mixing and loading operations. Do not apply or allow to drift to areas occupied by unprotected persons and animals or onto streams, lakes or ponds.

Hazard Rating:

Danger Poison

Furadan

Company:

Bayer Inc.

Formulations:

480 g/L carbofuran formulated as a flowable.

Container sizes: Furadan 480F - 4 L jug

How it Works:

Furadan is a broad spectrum, carbamate insecticide, acaricide and nematicide.

Effects of Weather:

Avoid spraying when winds are more than 15 km/hr or less than 5 km/hr. When conditions are hot and dry, set up equipment to produce larger droplets to reduce evaporation effects.

Tank Mixes:

Furadan 480F is compatible with fungicides commonly used on the same crops. Do not mix with Bordeaux and hydrated lime.

Restrictions:

Storage: Do not store below 2°C. Store separately from food and feed.

Aerial restrictions: Do not apply by air on potatoes or sunflowers. Do not spray fields of corn smaller than 12.5 acres (5 ha) by air.

Do not apply Furadan to areas where bees are actively foraging or near apiaries. Do not spray sunflowers after plants are more than 24 inches (60 cm) in height or after heads have started to form. The use of Furadan 480F may be hazardous to burrowing owls. Do not apply within 270 yards (250 m) of known burrowing owl nests. Do not make more than 2 applications per season to potatoes, corn, and sunflower.

Insects Controlled and Registered Crops:

FURADAN 480F

CROP	INSECT
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug
Corn (sweet, field, silage)	European corn borer
Sunflower	Sunflower beetle
Canola, mustard	Flea beetle, red turnip beetle

Application: Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage.

Rates, Costs and Preharvest Intervals:

FURADAN 480F

INSECT	RATE	COST	PREHARVEST INTERVAL
Potato leafhopper, tarnished plant bug	0.445 L/acre	$14.86/acre	7 days
Colorado potato beetle, potato flea beetle	0.222 L/acre	$7.41/acre	7 days
European corn borer	0.445 L/acre	$14.86/acre	7 days
Sunflower beetle	0.11 L/acre	$3.68/acre	60 days
Flea beetle (canola, mustard)	0.06 L/acre	$2.00/acre	Canola - 60 days Mustard - 21 days
Red turnip beetle	0.11 L/acre	$3.68/acre	Canola - 60 days Mustard - 21 days

Precautions:

Of high acute mammalian toxicity. Highly toxic to bees, waterfowl, birds, fish and other wildlife. Poisonous by swallowing or inhalation. Do not breathe spray mist. Do not get in eyes. Wear goggles at all times. Use an approved respirator. Do not re-enter fields less than 48 hours following application, unless appropriate protective clothing is worn. (i.e. long-sleeved shirt and long pants).

Hazard Rating:

Danger Poison

Gaucho 480 FL

(A component of Gaucho canola system and Gaucho Platinum)

Company:

Gustafson

Formulation:

480 g/L imidacloprid as a liquid seed treatment

Container size- 10L, 100L,

Insects Controlled and Registered Crops:

CROP	INSECT
Canola	Flea beetles

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Flea beetles	833 ml / 100kg seed (Gaucho canola system) 1667 ml / 100 kg seed (Gaucho Platinum)	N/A	N/A

Application:

Gaucho 480 FL is for use in commercial seed treaters only. Not for use in hopper-box, slurry-box, or other seed treatment applications at, or immediately before planting.

Registered Mixes:

Gaucho 480 FL is a component of the Gaucho Canola System and Gaucho Platinum, both of which are sold with the fungicides Vitavax rs and Apron FL.

How it Works:

Gaucho 480 FL is a systemic, chloronicotinyl insecticide that is used as a seed treatment.

Restrictions:

Treated seed must be labelled as follows: This seed has been treated with Gaucho 480 Fl- contains imidacloprid, do not use for food, feed or oil processing.

Do not graze or feed livestock on treated areas for 4 weeks after planting.

Treated canola or rapeseed stored for periods in excess of 9 months should be tested for germination before planting.

Precautions:

Gaucho 480 FL is highly toxic to birds and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. Do not contaminate water when disposing of equipment wash water. Cover or incorporate spilled treated seeds. Left over treated seed should be double sown around the headlands, or buried away from water sources.

Harmful if swallowed, absorbed through skin or inhaled. When handling Gaucho or Gaucho treated seed, work in a well-ventilated area and wear chemical resistant gloves. DO NOT use leather or cloth gloves.

Hazard Rating:

Caution Poison

Guthion/Sniper

Company:

Guthion - Bayer Inc.

Sniper - United Agri Products

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

Formulations:

240 g/L azinphos-methyl formulated as a spray concentrate and 50 percent azinphos-methyl formulated as a wettable powder.

Container sizes -
Sniper 240EC - 2 x 10 L
Guthion SC - 2 x 10 L
Guthion Solupak - 4 x 2 kg
Sniper 50W - 10 x 2 kg

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa, clover	Sweet clover weevil, grasshopper, lygus bug, alfalfa plant bug, leafhoppers, alfalfa weevil, spittlebugs
Rye	Grasshopper
Potatoes	Colorado potato beetle, tarnished plant bug, flea beetles, leaf hoppers

Note: Uses for canola, sunflowers, wheat, barley, oats and beans are on the previous labels for these products. The cutoff for these uses is December 31, 2001

Rates, Costs and Preharvest Intervals:

Guthion SC and Sniper 240-E

INSECT	RATE	COST	PREHARVEST INTERVAL
Sweet clover weevil (alfalfa, clover)	0.91 L/acre	$13.60/acre	21 days
Lygus bug, alfalfa plant bug, leafhoppers, spittlebugs alfalfa weevil (alfalfa, clover)	0.91 - 1.41 L/acre	$13.60 - $21.08/acre	21 days
Grasshoppers (border application only)	0.44 - 0.70 L/acre	$6.58 - $10.47/acre	21 days (alfalfa, clover) 30 days (rye)
Colorado potato beetle (potatoes)	0.70 L/acre	$10.47/acre	7 days
Tarnished plant bug, flea beetles, leafhoppers (potatoes)	0.91 - 1.41 L/acre	$13.60 - $21.08/acre	7 days

Guthion 50 Solupak WP and Sniper 50W Clean Pak:

INSECT	RATE	COST	PREHARVEST INTERVAL
Sweet clover weevil (alfalfa, clover)	0.45 kg/acre	$11.70/acre	21 days
Lygus bug, alfalfa plant bug, leafhoppers, spittlebugs, alfalfa weevil (alfalfa, clover)	0.45 - 0.70 kg/acre	$11.70 - $18.20/acre	21 days
Grasshoppers (border application only)	0.21 - 0.34 kg/acre	$5.46 - $8.84/acre	21 days (alfalfa, clover) 30 days (rye)
Colorado potato beetle (potatoes)	0.34 kg/acre	$8.84/acre	7 days
Tarnished plant bug, flea beetles, leafhoppers (potatoes)	0.45 - 0.70 kg/acre	$11.70 - $18.20/acre	7 days

Prices may vary depending on supplier.

Application:

May be applied by air or ground equipment. Apply when insects exceed economic threshold levels and use sufficient water for good coverage. Use higher rates for severe infestations, dense canopy or for adult insects (grasshoppers). Refer to label for specific mixing instructions.

How it Works:

Is a contact, non-systemic, organophosphate insecticide and acaricide.

Restrictions:

Storage: Store at temperatures above freezing. Keep away from heat and open flame. Keep separate from food or feed.

For grasshopper control in rye do not apply more than once per season. Do not apply to alfalfa or clover more than once per cutting at rates higher than 0.91 L/acre. Do not apply to crops in bloom or allow spray to drift toward beehives.

Precautions:

Reentry Period: Do not re-enter treated fields without protective equipment within 2 days of application.

Guthion/Sniper is of high acute mammalian toxicity and is poisonous if swallowed, inhaled or absorbed through the skin. Do not get in eyes or on skin. Do not breathe fumes or spray mist. Wear an approved agricultural respirator, protective clothing, natural rubber gloves and goggles when mixing or applying. Wash hands, arms and face thoroughly with soap and warm water after use. Wash all contaminated clothing with soap and hot water before reuse.

Highly toxic to bees. Do not spray crops in bloom. To protect fish and wildlife do not contaminate streams, lakes or ponds.

Hazard Rating:

Danger Poison

Imidan

Company:

United Agri Products

Formulation:

50% phosmet formulated as a wettable powder in water soluble sachets.

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa	Alfalfa weevil, Alfalfa blotch leafminer
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, potato aphid

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Alfalfa weevil, alfalfa blotch leafminer	0.91 kg/acre	$17.97/acre	7 days
Colorado potato beetle, potato flea beetle, potato leafhopper, potato aphid	0.91 kg/acre	$17.97/acre	7 days

Application:

Apply by ground only.

Imidan 50-WP instapak is packaged in water soluble sachets that are to be dropped into the spray tank unopened. Do not use in low-volume, gear-type spray equipment.

How it Works:

Imidan is an organophosphate insecticide.

Restrictions:

Storage: Keep sachets dry and do not allow sachets to contact any moist surface prior to adding to spray tank. Keep water soluble sachets in the protective container and store in a cool, dry place. Do not store at temperatures above 40°C.

Precautions:

Harmful if swallowed, inhaled or absorbed through the skin. Wear protective clothing, including rubber gloves and goggles, during mixing, loading and spraying.

Imidan is toxic to fish and bees. Keep out of any body of water.

Hazard Rating:

Danger Poison

Lannate

Company:

DuPont Canada Inc.

Formulations:

90% methomyl formulated as a water soluble powder. Container size - (24 x 225 gram water soluble bags).

Insects Controlled and Registered Crops:

CROP	INSECT
Canola	Alfalfa looper, bertha armyworm, clover cutworm, beet webworm
Flax	Bertha armyworm
Peas	Alfalfa looper, pea aphid
Wheat, oats, barley	True armyworm, thrips
Potatoes	Aphids, leafhoppers, flea beetles, variegated cutworm

Rates, Costs and Preharvest Intervals:

Lannate L

INSECT	RATE	COST	PREHARVEST INTERVAL
Alfalfa looper, bertha armyworm, clover cutworm, beet webworm (canola)	87.4 - 206.4 g/acre	$6.13 - $14.47/acre	8 days
Alfalfa looper, pea aphid (peas)	206.4 g/acre	$14.47/acre	1 day
True armyworm (cereals)	109.3 - 218.5 g/acre	$7.66 - $15.31/acre	20 days
Aphids, flea beetles, leaf hoppers (potatoes)	218.5 g/acre	$15.31/acre	3 days
Variegated cutworm	109.3 – 218.5 g/acre	$7.66 - $15.31/acre	3 days
Thrips (wheat, oats, barley)	121.4 g/acre	$8.51/acre	20 days
Bertha armyworm (flax)	89.0 - 109.3 g/acre	$6.24 - $7.66/acre	8 days

Application:

May be applied to canola, flax and cereals by air or ground equipment. Ground applications only to peas and potatoes. Apply when insects exceed threshold levels using sufficient water for good coverage.

Use higher rates for mature insects, dense canopy or when infestations are heavy. Early morning or late evening sprays are recommended.

When applied by air, pilot should not assist in mixing and loading operations. Apply a minimum of 22.5 L of water per ha (9.1 L/acre) for aerial application.

How it Works:

Lannate is a carbamate insecticide which works by contact and ingestion and has some systemic action. Rapidly degraded in green, growing plants; short term residual. Rapid knockdown.

Restrictions:

Storage: Do not store below 0°C. Store in original container away from other pesticides, fertilizer, food or feed.

Others: Sprays or drift must not contact workers, other persons or animals. The area being treated must be vacated by unprotected persons.

Precautions:

Lannate is of high acute mammalian toxicity. May be fatal or cause blindness if swallowed. Poisonous if inhaled. Do not breathe vapours or spray mist. Do not get in eyes, on skin or on clothing.

Toxic to fish, birds and other wildlife. Keep out of any body of water. Do not apply where run-off is likely to occur. Do not allow to drift from treated areas. Highly toxic to bees exposed to direct application. Do not apply to areas being visited by bees. Time applications to coincide with minimum bee activity.

When mixing, loading or applying Lannate, wear protective clothing, goggles and an approved respirator. Wear clean clothes daily. Wash thoroughly after handling or applying.

First Aid:

If swallowed, drink 1 to 2 glasses of water and induce vomiting. Get medical attention immediately. If inhaled, remove from exposure. If patient is not breathing, begin artificial respiration immediately. In case of contact, wash skin with plenty of soap and water. If in eyes, flush with water for 15 minutes. Remove and wash contaminated clothing before re-use. Atropine sulphate is an antidote.

Hazard Rating:

Danger Poison

Lorsban 4E/Nufos/Pyrinex

Company:

Lorsban - Dow AgroSciences

Pyrinex - United Agri Products

Nufos - Cheminova

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

Formulations:

480 g/L chlorpyrifos formulated as an emulsifiable concentrate. Container sizes - 10 L jug, 115 L returnable container, 208 L drum.

Insects Controlled and Registered Crops:

CROP	INSECT
Barley, oats, wheat	Army, dark sided, pale western and redbacked cutworms; armyworms, grasshoppers
Wheat	Russian wheat aphid, brown wheat mite, orange wheat blossom midge
Canola	Dark-sided, redbacked, variegated, pale western, and army cutworms; bertha army worm, alfalfa looper, armyworm, diamondback moth larvae, grasshoppers, lygus bug
Flax	Dark-sided, redbacked, varigated, pale western, and army cutworms, armyworm, bertha armyworm
Lentils	Pale western cutworm, grasshoppers
Sunflowers	Redbacked, pale western and army cutworms, sunflower seed weevil
Field and sweet corn	Dark sided, black and redbacked cutworms
Potatoes	Colorado potato beetle (larvae), potato flea beetle, tarnished plant bug, red-backed cutworm, black cutworm, darksided cutworm

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Armyworm, army cutworm, darksided cutworm, pale western cutworm, redbacked cutworm (except potatoes and corn)	0.354 - 0.486 L/acre	$5.53 - $8.57/acre	60 days (barley, wheat, oats) 21 days (canola and flax) 60 days (lentils) sunflowers - 42 days - Lorsban, Nufos 90 days - Pyrinex
Grasshoppers (except lentils)	0.235 - 0.354 L / acre	$3.67 - $6.24 / acre	60 days (barley, wheat, oats) 21 days (canola)
Grasshoppers (lentils)	0.235 - 0.486 L/acre	$3.67 - $8.57/acre	21 - 60 days
Brown wheat mite	0.253 L/acre	$3.95 - $4.46/acre	60 days
Russian wheat aphid	0.202 L/acre	$3.15 - $3.56/acre	60 days
Wheat midge	0.336 - 0.405 L/acre	$5.24 - $7.14/acre	60 days
Alfalfa looper, armyworm (canola)	0.304 - 0.405 L/acre	$4.74 - $7.14/acre	21 days
Diamondback moth larvae, lygus bug	0.405 L/acre	$7.14/acre	21 days
Bertha armyworm	0.304 - 0.405 L/acre	$4.74 - $7.14/acre	21 days
Sunflower seed weevil*	0.486 L/acre	$8.57/acre	42 days
Darksided cutworm, black cutworm, redbacked cutworm (potatoes, sweet and field corn)	0.971 L/acre (preplant treatment) 0.486 - 0.971 L/acre (seedling treatment)	$15.61 - $17.12/acre $7.59 - $17.12/acre	7 days (potatoes) 70 days (corn)
Larvae of Colorado potato beetle, potato flea beetle, tarnished plant bug	0.405 L/acre	$6.32 - $7.14/acre	7 days

***Lorsban 4E and Nufos 4E only**

Prices may vary depending on supplier.

Application:

May be applied by air or ground equipment. Ground application only for redbacked cutworm control in corn and sunflower. Ground application only for potatoes. Uniform coverage of the crop is essential in aerial applications. Apply when insects exceed economic threshold levels and use sufficient water for good coverage. Use higher rates for heavy infestations, mature insects, heavy crop canopy, or under dry soil conditions.

How it Works:

Lorsban and Pyrinex and Nufos are broad spectrum, non-systemic insecticides. They work by contact, ingestion and vapour action (inhalation).

Effects of Weather:

Avoid application under hot temperatures. Best results will be obtained when application is made in evening (after 7 p.m.) or morning (before 8 a.m.). Do not apply to plants under extreme drought stress or crop injury may occur.

Tank mixes:

Lorsban 4E may be tank mixed with the following herbicides:

- Avenge 200-C
- Banvel plus 2,4-D amine
- Buctril M
- MCPA ester and amine
- 2,4-D amine and ester

When tank mixing always add the herbicide to the spray tank, then add Lorsban 4E. If Lorsban 4E is added first, settling out may occur causing plugging of lines or nozzles.

Restrictions:

Grazing: Treated cereals grown for cover crop should not be used for human or animal consumption within 60 days of harvest.

Storage: Combustible. Do not store near heat or flame. Do not store with food, feed, drugs or clothing.

Others: Do not use more than 9 applications on potatoes per season.

Do not use more than 5 applications or more than a total of 2.162 L/acre on wheat, barley and oats.

Precautions:

Lorsban 4E and Pyrinex 480 EC and Nufos 4E have a high acute mammalian toxicity. Very toxic to bees, fish, birds, aquatic organisms and other wildlife. May be fatal if swallowed. Causes substantial but temporary eye injury. Harmful if absorbed through skin. May cause skin or eye irritation. Wear protective clothing, impervious gloves and goggles. Wash thoroughly with soap and water after handling and applying. Immediately remove contaminated clothing and wash before re-use. Do not apply or allow to drift on to workers or other persons.

Do not apply directly to water or where runoff could occur to adjacent aquatic sites. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Avoid use when bees are actively foraging

Hazard Rating:

Danger Poison

Malathion/Fyfanon

Company:

Malathion - United Agri Products, IPCO

Fyfanon - Cheminova

Different companies produce malathion. Note differences in label recommendations. Check your label for more information.

Formulations:

500 g/L malathion formulated as an emulsifiable concentrate.

Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels using sufficient water for good coverage. Use higher rates for heavy infestations, dense canopy or mature stages of insects.

Insects Controlled and Registered Crops:

CROP OR STRUCTURE	INSECT
Alfalfa, clover	Grasshopper (young), aphid, lygus bug, alfalfa weevil larvae, leafhoppers, alfalfa blotch leafminer, spider mites
Canola	Flea beetle, diamondback moth, grasshopper (young)
Wheat, barley, oats, rye	Grasshopper (young), aphid, true armyworm
Potatoes	Colorado potato beetle, leafhopper, aphid, spider mites
Canaryseed	Aphid
Sweet clover	Sweet clover weevil
Flax, lentils, hay, pasture	Grasshopper (young)
Corn (grain, forage)	Earworms, European corn borers
Beans, peas	Aphids, leafhoppers, spider mites
Empty grain bins, grain elevators, grain box cars, flour mills	Confused flour beetles, flat grain beetles, granary weevils, grain mites, Indian meal moths, lesser grain borers, red flour beetle, rice weevils, rusty grain beetles, sawtoothed grain beetles

Rates, Costs and Preharvest Intervals:

Malathion 500 (IPCO)

INSECT	RATE	COST	PREHARVEST INTERVAL
Leafhoppers, Colorado potato beetle, aphids (potato)	0.56 - 0.80 L/acre	$4.14 - $5.92/acre	3 days
Grasshopper (alfalfa) Grasshopper (cereals) Grasshopper (flax, canola) Grasshopper (lentils)	0.80 - 1.21 L/acre 0.68 L/acre 0.44 - 0.68 L/acre 0.68 L/acre	$5.92 - $8.95/acre $5.03/acre $3.26 - $5.03/acre $5.03/acre	7 days 7 days 7 days 14 days
Diamondback moth (canola)	0.22 - 0.34 L/acre	$1.63 - $2.52/acre	7 days
Flea beetle (canola)	0.44 L/acre	$3.26/acre	7 days
Sweet clover weevil	0.56 - 1.01 L/acre	$4.14 - $7.47/acre	7 days
True armyworm, aphids (wheat, oats, barley, rye)	0.60 - 0.80 L/acre	$4.44 - $5.92/acre	7 days
Lygus bug, alfalfa weevil, leafhoppers, aphids, spittlebugs (alfalfa)	0.80 - 1.21 L/acre	$5.92 - $8.95/acre	7 days
Aphids, mites, leafhoppers (beans)	0.56 – 1.21 L/acre	$6.19 - $ 13.37/acre	1 day
Rusty grain beetle, sawtoothed grain beetle, confused flour beetle, grain mite, granary weevil, Indian meal moth, lesser grain borer (empty grain bins)	250 – 300 ml / 5 L of water on 100m²	$2.76 - $ 3.32/100m²	May be used within 1 day of grain storage

Malathion 500E (United Agri Products), Fyfanon (Cheminova)

INSECT	RATE	COST	PREHARVEST INTERVAL
Aphids (alfalfa, clover)	0.91 - 1.11 L/acre	$11.18 - $13.64/acre	7 days
Aphids (beans)	0.61 - 1.11 L/acre	$7.50 - $13.64/acre	1 day (Fyfanon), 3 days Malathion 500E
Pea aphids (peas)	0.91 L/acre	$11.18/acre	3 days
Aphids (potatoes)	0.61 - 0.91 L/acre	$7.50 - $11.18/acre	3 days
Aphids (barley, oats, wheat, rye)	0.45 - 1.11 L/acre	$5.53 - $13.64/acre	7 days
Aphids (canary grass - for seed)	0.56 L/acre	$6.88/acre	14 days
Grasshoppers (alfalfa, clover)	0.91 - 1.11 L/acre	$11.18 - $13.64/acre	7 days
Grasshoppers (flax)	0.45 - 0.71 L/acre	$5.53 - $8.73/acre	7 days
Grasshoppers (lentils)	0.69 L/acre	$8.48/acre	14 days
Grasshoppers (canola, mustard)	0.45 - 0.71 L/acre	$5.53 - $8.73/acre	7 days
Grasshoppers (wheat, oats, rye, barley)*	0.91 - 1.11 L/acre	$11.18 - $13.64/acre	7 days
Grasshoppers (pastures)*	0.69 - 1.2 L/acre	$8.48 - $14.75/acre	7 days
Leafhoppers, spider mites (alfalfa, clover)	0.91 - 1.11 L/acre	$11.18 - $13.64/acre	7 days
Leafhoppers, spider mites (beans)	0.61 - 1.11 L/acre	$7.50 - $13.64/acre	1 day(Fyfanon), 3 days Malathion 500E
Leafhoppers, spider mites (peas)	0.91 L/acre	$11.18/acre	3 days
Leafhoppers , spider mites (potatoes)**	0.61 - 0.91 L/acre	$7.50 - $11.18/acre	3 days
Alfalfa weevil larvae, lygus bugs (alfalfa)	0.91 - 1.11 L/acre	$11.18 - $13.64/acre	7 days
Alfalfa blotch leafminer	1.11 L/acre	$13.64/acre	7 days
Earworms, European corn borers (corn)	0.91 - 1.11 L/acre	$11.18 - $13.64/acre	5 days
Armyworms (barley, oats, wheat, rye)	0.45 - 1.11 L/acre	$5.53 - $13.64/acre	7 days
Flea beetles (canola, mustard)	0.45 - 0.71 L/acre	$5.53 - $8.73/acre	7 days
Diamondback moth larvae (canola, mustard)	0.22 - 0.34 L/acre	$2.70 - $4.18/acre	7 days
Colorado potato beetle (potatoes)	0.61 - 0.91 L/acre	$7.50 - $11.18/acre	3 days
Spittlebugs (alfalfa, clover*)	0.91 - 1.11 L/acre	$11.18 - $13.64/acre	7 days
Sweet clover weevils (sweet clover)	0.61 - 1.01 L/acre	$7.50 - $12.41/acre	Cattle may be returned immediately after spraying
Rusty grain beetle, red flour beetle, sawtoothed grain beetle, confused flour beetle, grain mite, granary weevil, Indian meal moth, lesser grain borer, flat grain beetles, rice weevils	333 ml / 5 L of water on 100 m²	$410 / 100 m²	Wait until spray has thoroughly dried before storing grain in treated areas.

*Malathion 500E only.

**Fyfanon only.

How it Works:

Malathion is a non-systemic, contact, organophosphate insecticide and acaricide of brief to moderate persistence. Generally non-phytotoxic.

Effects of Weather:

Apply only when daytime temperatures are above 20°C.

Restrictions:

Grazing: When spraying forages and pastures, cattle should be removed and returned after spraying.

Storage: Do not store near food or feed. Store in a cool dry place but not below -10°C. Protect from heat.

Others: Do not apply to any plant in bloom. Apply to crops when bees are absent from field. Avoid contact with automobile paint and wash immediately if exposure occurs.

Precautions:

Malathion has a low acute mammalian toxicity. Highly toxic to bees and fish. Wear protective clothing to reduce skin and eye exposure.

Hazard Rating:

Caution Poison - UAP Malathion, Fyfanon

Warning Poison - IPCO Malathion

Matador

Company:

Syngenta

Formulations:

120g/L cyhalothrin-lambda.

Container size - 3.78 L (4 x 3.78 L).

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug, tuber flea beetle, Lygus bug
Canola, mustard	Crucifer flea beetle, grasshoppers, Lygus bug
Sunflower	Sunflower beetle
Wheat, barley, oats	Grasshoppers
Unimproved pasture, summerfallow, alfalfa	Grasshoppers
Flax	Grasshoppers
Alfalfa	Alfalfa weevil, Lygus bugs, pea aphid, potato leafhopper
Corn	European corn borer, corn earworm, fall armyworm, cutworms

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug, tuber flea beetle	0.034 - 0.050 L/acre	$4.57 - $6.72/acre	7 days
Crucifer flea beetle, Lygus	0.034 L/acre	$4.57/acre	50 days
Sunflower beetle	0.017 - 0.026 L/acre	$2.28 - $3.49/acre	70 days
Grasshoppers*	0.026 - 0.034 L/acre	$3.49 - $4.57/acre	Canola, mustard - 50 days Cereals - 28 days Flax - 50 days
Alfalfa weevil, Lygus bugs (alfalfa), pea aphid, potato leafhopper (alfalfa)	0.034 L / acre	$4.57/acre	Do not apply within 14 days of livestock foraging.
European corn borer, corn earworm, fall armyworm, cutworms	0.034 L / acre	$4.57/acre	1 day (sweet corn), 14 days (silage)

*** Do not graze cereals or unimproved pasture for 14 days after treatment.**

Application:

Apply by ground only in corn and alfalfa. Application can be made by ground or air for potatoes, canola, mustard, sunflowers, flax, wheat, barley, oats, unimproved pasture, and summerfallow.

Timing:

For potato insects, timing of application should be based on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring.

For sunflower beetles, use the high rate to control adults.

For flea beetles, to prevent migration of overwintering adults throughout the field, spray a 15 m strip around the field at the first sign of flea beetle feeding.

For grasshoppers, apply the low rate when grasshoppers are up to the 3rd nymphal stage (up to 1 cm in length) or when insect numbers are low. Apply the high rate when insects are larger, up to but not including, winged adults or when insect numbers are high.

How it Works:

A synthetic pyrethroid insecticide. It is a fast acting stomach and contact insecticide effective against a broad spectrum of foliar pests. It has no fumigant or systemic activity.

Effects of Weather:

For best results, apply Matador 120 EC during the early morning before temperatures rise, and during the evening, past the heat of the day.

Restrictions:

Grazing: Do not graze or feed lactating dairy animals on treated green cereal forage or treated pasture.

Storage: Store above 0°C. Storage below 0°C will not impair the effectiveness of Matador 120 EC, however, following such storage, agitate well before use.

Others: Do not apply by air. Do not use more than 3 applications per year. Allow a 7-day interval between applications. Do not apply within 15 m of productive fisheries water, or waterfowl habitat.

Precautions:

Matador has potential for skin and eye irritation. Avoid splashing in eyes or on skin, particularly the face. If hands are contaminated, wash with soap and water before touching other areas of skin. This product is very toxic to bees. Avoid spraying when bees are foraging. Spray deposits should be dry before bees commence foraging in treated crops.

Hazard Rating:

Danger Poison

Methoxychlor

Company:

United Agri Products

Formulation:

240 g/L formulated as an emulsifiable concentrate.

Insects Controlled and Registered Crops:

CROP	INSECT
Beans	Leafhoppers
Potatoes	Blister beetles, Colorado potato beetles, flea beetles, leafhoppers
Alfalfa, Clover	Alfalfa weevil, armyworms, sweet clover weevil, leafhoppers, grasshoppers
Wheat, oats, barley, rye, corn	Armyworms

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Leafhoppers (beans)	1.21 - 3.64 L/acre	$18.51 - $55.69/acre	7 days
Blister beetles, Colorado potato beetles, flea beetles, leafhoppers (potatoes)	1.21 - 3.64 L/acre	$18.51 - $55.69/acre	7 days
Alfalfa weevil, sweet clover weevil, leafhoppers, grasshoppers	2.02 - 2.53 L/acre	$30.91 - $38.71/acre	7 days
Armyworms	2.83 - 4.55 L / acre	$43.30 - $69.62/acre	7 days

Application:

Ground application only

Apply in sufficient water to obtain thorough uniform coverage (usually 1000 L of water is required to cover 1 ha).

How it Works:

Methoxychlor is an organochlorine insecticide effective against a wide range of insect pests.

Restrictions:

Storage: Store away from food or feed.

Others: Do not treat alfalfa or clover during bloom.

Precautions:

Avoid inhaling spray mist. Avoid contact with skin, eyes and clothing. Avoid contamination of feed and food. Wash after using.

Methoxychlor is very highly toxic to fish and aquatic invertebrates. Avoid contamination of ponds, lakes, streams, and other bodies of water which contain fish life or which may be used for irrigation or domestic purposes.

Monitor

Company:

Bayer Inc., United Agri Products

Formulations:

480 g/L methamidophos formulated as a liquid. Container size - 10 L pail.

Insects Controlled and Registered Crops:

CROP	INSECT
Canola	Bertha armyworm, grasshoppers
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, aphids

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Bertha armyworm	0.23 - 0.5 L/acre	$6.56 - $14.25/acre	10 days
Grasshoppers	0.5 L/acre	$14.25/acre	10 days
Colorado potato beetle, potato flea beetle, potato leafhopper, aphids (potatoes)	0.71 - 0.91 L/acre	$20.24 - $25.94/acre	14 days

Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels using sufficient water for good coverage. Use higher rates for mature stages of insects, dense canopy or heavy infestations.

How it Works:

A broad spectrum organophosphorous insecticide and acaricide which works by contact and systemic action. Contact effectiveness may persist for 7 to 21 days.

Restrictions:

Storage: Store in a cool, dry place but not below -10°C. Do not store near food or feed. Protect from heat.

Others: Only 2 applications per season may be made on canola for bertha armyworm and grasshoppers. Highly toxic to bees exposed to direct treatment or residues on crops. Avoid use during flowering and pollination periods. Do not contaminate any bodies of water.

Precautions:

Monitor is of high acute mammalian toxicity and is extremely toxic to fish, wildlife and bees. Poisonous if swallowed, inhaled or absorbed through skin. Rapidly absorbed through skin. Wear an approved respirator, natural rubber gloves, protective clothing and goggles. Wash hands, arms and face with soap and water after handling and applying. Wash all contaminated clothing with soap and hot water before re-use. Keep unprotected persons out of operating or spray areas or where drift could occur.

Do not re-enter treated areas until drifting insecticide and volatile residues have dissipated. Do not store or transport with feed or food.

Hazard Rating:

Danger Poison

Orthene

Company:

Distributed by United Agri Products

Formulation:

75 percent Acephate as a water soluble powder. Container size – case of 12 x 1.5 kg

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	green peach aphid, potato aphid, potato flea beetle, potato leafhopper, tarnished plant bug

Rates, Cost and Preharvest Intervals:

Insect

Green peach aphid, potato aphid, potato flea beetle, potato leafhopper, tarnished plant bug

Rates:

0.300 kg (in 90 litres water) – 0.44 kg (in 660 litres of water)/ acre

Cost:

$15.35 - $22.51/acre

Preharvest Interval

Do not apply within 21 days of harvest.

Application:

Apply with conventional ground equipment only. Do not apply by air.

Apply only when insects exceed economic thresholds.

Use higher rate only for heavy infestations.

How it Works:

Acephate is an organophosphate systemic insecticide that works through contact and as a stomach poison.

Effects of Weather:

Do not apply if rainfall is expected within 48 hours after application. Treatment areas should not be irrigated for at least 43 hours after application.

Restrictions:

Storage: Store in cool, dry place, in the original container away from food or feed. Protect from excessive heat.

Environment: Orthene has the potential to leach through soils to ground water. It is recommended that Orthene is not used on coarse textured soils or in areas where the water table may be high.

Do not feed foliage to livestock or allow animals to graze on treated areas.

Do not make more than 4 applications per season.

Others: Orthene is not registered in the United States. Therefore Orthene should not be used on any produce destined for markets in the United States.

Precautions:

Orthene is toxic to birds and mammals.

Orthene is toxic to aquatic invertebrates. Do not apply where runoff or drift is likely to occur.

Orthene is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are foraging in the treatment area. Beekeepers should be warned to protect bees from treated areas for one week after treatment.

First Aid:

If swallowed, induce vomiting and obtain medical attention or call a poison control centre immediately. In case of contact with skin, wash with soap and water. If in eyes, flush with water. See a physician if eye irritation persists. Atropine is an antidote.

Hazard Rating:

Orthene 75%:

Caution Poison

Parathion

Company:
United Agri Products

Formulation:
960 g/L parathion formulated as an emulsifiable concentrate

Insects Controlled and Registered Crops

Beans	Aphids, leafhoppers, leafminers, thrips
Corn (field and sweet)	Aphids, armyworms, corn earworm, European corn borer, leafminers, thrips
Forage crops and pastures	Aphids, armyworms, blister beetles, leafhoppers
Peas	Alfalfa looper, aphids

Rate, Costs, Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Aphids, leafhoppers, leafminers, thrips (beans)	0.15 - 0.24 L/acre	$5.57 - $8.90/acre	14 days
Aphids, armyworms, corn earworm, European corn borer, leafminers, thrips (Corn)	0.24 - 0.29 L/acre	$8.90 - $10.76/acre	14 days
Aphids, armyworms, blister beetles, leafhoppers (forage crops and pastures)	0.12 - 0.21 L/acre	$4.45 - $7.79/acre	14 days
Alfalfa looper, aphids (peas)	0.09 - 0.18 L/acre	$3.34 - $6.68/acre	14 days

Application:
Ground application only. Do not use parathion with ultra low volume hand held sprayers. Do not apply more than twice per season to any crop.

How it Works:
A broad-spectrum organophosphate insecticide

Restrictions:
Reentry period: Do not re-enter treated areas within 48 hours after spraying. If workers must re-enter treated areas between 2 and 14 days after spraying, protective clothing including coveralls over a long sleeved shirt and long pants, and a chemically resistant hat or hood, chemically resistant (rubber, neoprene) footwear and gloves must be worn.

Storage: Parathion should be stored at temperatures not exceeding 25°C, nor should it be heated above 55°C.

Precautions:

Parathion is toxic to fish and wildlife. Birds and other wildlife in treated areas may be killed. Keep out of any body of water. Do not apply when weather conditions favour drift from treated areas, or when run-off is likely to occur.

Do not mix, load or apply indoors. Always work to the windward side when handling or spraying parathion. Do not use parathion on excessively hot days.

Before removing gloves after contacting parathion, wash them with soap and water.

Immediately after working with parathion, workers must wash entire body with soap and water and change into clean clothing. Wash protective clothing separately from other household laundry with heavy-duty detergent and hot water.

If symptoms of parathion poisoning such as headache, nausea, trembling, blurred vision, etc. develop while using parathion, stop work immediately and seek medical attention.

Hazard Rating:

Danger Poison

Pirimor

Company:

Syngenta

Formulation:

50 percent pirimicarb formulated as a dry flowable. Container sizes - 10 x 1 kg bags.

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	Green peach aphid, potato aphid, buckthorn aphid
Peas	Pea aphid
Sweet corn	Aphids

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Green peach aphid, potato aphid, buckthorn aphid (potatoes)	0.170 - 0.220 kg/acre	$15.09 - $19.57/acre	7 days
Pea aphid	0.06 - 0.110 kg/acre	$5.32 - $9.76/acre	6 days
Aphids (sweet corn)	0.220 kg/acre	$19.52/acre	3 days

Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage. Use higher rates when insect populations are high or when very cool weather is prevailing.

How it Works:

A fast-acting aphicide that works by contact, vapour and local systemic action.

Restrictions:

Storage: Store in original container in a dry place. Highly flammable.

Others: Do not contaminate any bodies of water.

Precautions:

Pirimor is of high acute mammalian toxicity. Avoid breathing dust or spray mist. Avoid contact with skin and eyes. Harmful to livestock. Avoid contamination of food or feed, ponds, lakes and waterways. Wear suitable gloves, protective clothing and an eye protector.

Hazard Rating:

Danger Poison

Ripcord

Company:

BASF

Formulation:

400 g/L cypermethrin formulated as an emulsifiable concentrate.

Container size - 1 L.

Insects Controlled and Registered Crops:

CROP	INSECT
Wheat, barley	Grasshoppers, cutworms
Canola	Grasshopper, flea beetle, bertha armyworm
Roadsides, headlands, summerfallow	Grasshopper
Sunflower	Sunflower beetle, sunflower seed weevil
Corn	European corn borer, cutworms, corn earworm
Potatoes	Colorado potato beetle, flea beetle, leafhopper, tarnished plant bug, cutworms

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Grasshopper (up to fourth instar, prior to wing development)	0.02 - 0.028 L/acre	$2.11 - $2.95/acre	Barley - 60 days Wheat - 30 days Canola - 30 days
Cutworms (black, white, darksided, redbacked, army and pale western)	0.07 L/acre	$7.38/acre	21 days
Flea beetle (canola)	0.02 L/acre	$2.11/acre	30 days
Bertha armyworm	0.028 L/acre (ground) 0.036 L/acre (air)	$2.95/acre $3.79/acre	30 days
Sunflower beetle	0.028 L/acre	$2.95/acre	70 days
Sunflower seed weevil	0.028 L/acre	$2.95/acre	70 days
European corn borer, corn earworm	0.07 L/acre	$7.38/acre	5 days
Colorado potato beetle, flea beetle, leafhopper,	0.025 - 0.05 L/acre	$2.64 - $5.27/acre	7 days
Tarnished plant bug	0.05 L/acre	$5.27/acre	7 days

Application:

Ripcord may be applied by ground application only for control of grasshoppers on wheat, barley, roadsides, headlands and canola; for flea beetle control on canola; and for control of cutworms.

Ripcord may be applied by ground or air for bertha armyworm, sunflower beetle, sunflower seed weevil, corn earworm, European corn borer and Colorado potato beetle, flea beetle, leafhoppers and tarnished plant bug on potatoes. Only 1 aerial application is permitted per season for bertha armyworm on canola and sunflower beetle and seed weevil on sunflower, and 2 applications per season for corn and potatoes.

Observe a 16 yard (15 m) setback from water bodies and other sensitive areas when applying Ripcord with ground application. Observe a 110 yard (100 m) setback from water bodies and sensitive areas when applying by air.

Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage. Use higher rates for mature insect stages (grasshoppers) or severe infestations.

How it Works:

A pyrethroid insecticide that works as a contact and stomach poison.

Effects of Weather:

Activity of Ripcord on grasshoppers is reduced as soil temperature increases. Application for grasshopper control should be made at temperatures below 25°C. Spraying for grasshoppers should be delayed until evening if daytime temperatures are above 25°C.

Restrictions:

Grazing: Treated crops must not be grazed or cut for hay.

Storage: Keep in original container during storage. Do not contaminate or store near foodstuffs.

Precautions:

Ripcord is of low to moderate acute mammalian toxicity and very toxic to bees, fish, and aquatic organisms. Harmful or fatal if swallowed. May be harmful if absorbed through skin.

Severely irritating to eyes. Causes skin irritation and sensitization. Wear long-sleeved protective clothing and gloves when handling or applying. Wear face shield or goggles when mixing. Do not apply where streams, lakes and ponds may be contaminated. Avoid spraying when bees are foraging.

Hazard Rating:

Caution Poison

Sevin XLR Plus

Company:

Aventis CropScience

Formulation:

480 g/L carbaryl formulated as a liquid suspension (Sevin XLR Plus).

Container size - Sevin XLR Plus - 10 L jug.

Insects Controlled and Registered Crops:

CROP	INSECT
Canola	Flea beetle
Alfalfa, clover	Grasshopper, blister beetle, leafhoppers
Barley, oats, rye, wheat	True armyworm, grasshopper
Ditchbanks, field borders, forage grasses, headlands, pastures, rangelands, rights-of-way, wastelands	Grasshopper
Corn (field and sweet)	European corn borer, corn earworm, grasshopper
Potatoes	Colorado potato beetle, flea beetle, leafhopper
Beans	Leafhoppers, lygus bugs

Rates, Costs and Preharvest Intervals:

Sevin XLR Plus

INSECT	RATE	COST	PREHARVEST INTERVAL
Flea beetle (canola)	0.2 L/acre	$2.72/acre	seedling application only
Grasshopper (non-crop, forage grasses, pasture, rangeland)	0.48 - 1.41 L/acre	$6.53 - $19.18/acre	0 days (non-crop) 1 day (forage grasses, pasture, rangeland)
Grasshopper (alfalfa, clover, cereals, corn)	0.50 - 1.01 L/acre	$6.80 - $13.74/acre	2 days (alfalfa, clover) 14 days (wheat, oat, rye) 28 days (barley) 1 day (corn)
Blister beetles, leafhoppers (alfalfa, clover)	1.01 - 1.6 L/acre	$13.74 - $21.76/acre	2 days
True armyworm (see above)	1.01 - 2.10 L/acre	$13.74 - $28.56/acre	14 days (wheat, oat, rye) 28 days (barley)
European corn borer, corn earworm (corn)	1.01 - 1.61 L/acre	$13.74 - $21.76/acre	1 day
Colorado potato beetle, flea beetle, leafhopper (potatoes)	0.50 L/acre	$6.80/acre	7 days
Leafhoppers (beans)	1.01 L/acre	$13.74/acre	5 days
Lygus bugs (beans)	2.12 - 2.59 L/acre	$28.83 - $35.22/acre	5 days

Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage. Use lower rates on young plants and early stages of insects and higher rates on mature plants and advanced stages of insects, or mature insects.

Dilutions of 1 volume of XLR Plus with 1 volume of water will allow maximum resistance to wash off by rainfall. Application to dry foliage will ensure greater wash off resistance.

How it Works:

A carbamate insecticide that works by contact and ingestion. Moderate to rapid in speed of action with short to moderate residual activity (2 to 4 weeks).

Effects of Weather:

To avoid possible injury to tender foliage, do not apply to wet foliage or if rain or high humidity is expected during the next two days.

Restrictions:

Storage: Do not store in areas where temperatures frequently exceed 38°C. Store in original container in a cool dry area out of reach of children and animals and away from food and feed.

Others: Remove cattle from area when spraying.

Precautions:

Sevin is of moderate acute mammalian toxicity. This product is highly toxic to honeybees exposed to direct treatment on blooming crops or weeds. Harmful if inhaled or swallowed. Avoid contact with skin and eyes. Wear long sleeve work clothing and change to clean clothing daily. Wash hands and face after handling. Avoid contamination of food, feed, water supplies, streams and ponds.

Hazard Rating:

Warning Poison

Thimet

Company:

BASF

Formulations:

15 percent phorate formulated as a granular. Container size - 20 kg bag.

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	Aphids, leafhoppers, reduction of potato flea beetle and wireworm damage, and early season control of Colorado potato beetle
Beans	Leafhoppers, aphids, lygus bugs, thrips, mites

Rates, Costs and Preharvest Intervals:

INSECT	RATE	COST	PREHARVEST INTERVAL
Aphids, leafhoppers, reduction of potato flea beetle and wireworm damage and early season control of Colorado potato beetle (potatoes)	140 g/110 yard (100 m) row in sandy or light soil. 215 g/110 yard (100 m) row in silt or heavy soils.	$0.64 - $0.99/100 m row	At planting application only. Do not harvest before 90 days after planting time.
Leafhoppers, aphids, lygus bugs, thrips, mites (beans)	2.93 - 4.45 kg/acre	$13.45 - $20.43/acres	Do not apply later than at planting time.

Application:

Ground application at seeding time: Distribute granules evenly in furrow or granules may be banded on each side of the row at planting time. Use low rate for sandy or light soils and high rate for silt or heavy soils. Works as a systemic poison with effective initial residual activity on soil and foliar insects.

How it Works:

An organophosphate insecticide that works as a systemic poison, with effective initial residual activity on soil and foliar insects.

Restrictions:

Storage: Do not store in or around the home. Store away from food or feed. Store open bags in labelled sealed drums or heavy plastic bags.

Others: Do not use in muck soils. Do not apply later than at planting time. Will provide reduction of potato flea beetle and wireworm damage and early season potato beetle control.

Precautions:

Thimet is of high acute mammalian toxicity and is highly toxic to fish, birds and other animals. Do not allow product to contact eyes and skin. Poisonous by skin contact, inhalation or swallowing. Repeated inhalation or skin contact with Thimet 15G, other organophosphorus or carbamate insecticides may, without symptoms, progressively increase susceptibility to poisoning. Wear freshly-laundered, long-sleeved work clothing daily. Use rubber gloves when transferring from package to equipment. Sleeve cuffs should be worn over gloves to prevent granules from falling into the gloves. Rubber gloves should be washed with soap and water after each use. Destroy and replace gloves frequently. In case of contact, immediately remove contaminated clothing and wash skin thoroughly with soap and water. While emptying bags into equipment, pour downwind and allow as little free fall as possible. The use of a dust mask is recommended.

Hazard Rating:

Danger Poison

Insect Control in Stored Grain

Prevention

The first step towards keeping stored grain free of insects is prevention. Storage and transport facilities should be cleaned thoroughly and sprayed or dusted, if needed, with a recommended insecticide before storing grain in the bin (e.g. malathion or Protect-It diatomaceous earth - refer to label for details). Clean storage will eliminate one source of infestation. However, grain stored for long periods of time still has the potential for renewed infestations. Ideally, the grain should be dry before being put into storage, and cooled as quickly as possible. Aeration systems used during the night immediately after harvest should have the grain below 20°C in 2 weeks. Grain insects cannot multiply at these temperatures. Cooling the grain, through aeration, or moving the grain several times during mid-winter should provide effective control of rusty grain beetles. Moving the grain using pneumatic conveyors (grain vacs) has also been shown to be an effective means of controlling free-living insects in stored grain.

Identification of the pests

Regular monitoring of the stored grain is the next step in determining the presence and potential for serious infestations. Either the presence of insects or damaged kernels will give an indication of a problem. Probably the most sensitive means of detecting insects in stored grain is through the use of probe traps, available from Hedley Technologies Inc. Often the first indication of an infestation will be found near the top centre of a storage bin. As with other insect pests, correct identification of insects present can be important in determining the problem and possible solutions. There are several insects that can be found in stored grains in Manitoba and Saskatchewan. Some of these insects feed on the grains, while others feed on fungus that may be developing in the stored grain.

Grain feeders: Insects that feed on the grain include rusty grain beetles, red flour beetles, and saw-toothed grain beetles. The **rusty grain beetle** is the most common stored product insect. The adult is a flat, rectangular, reddish brown beetle, 2 mm long, with long threadlike antennae. Heavy infestations of this insect cause grain to heat and spoil. The **red flour beetle** is the another common insect pest of stored grain in the prairies. Adults are reddish-brown and 4 mm long. Red flour beetles cannot feed on undamaged, dry seed with less than 12% moisture content. They prefer grain dust, broken grain and milled stocks. Adult **saw-toothed grain beetles** are brown, about 3 mm long, and have six teeth-like projections on each side of the thorax. Saw-toothed grain beetles are more common in stored oats than in stored wheat and barley.

Fungus feeders: Insects that feed on fungus in the grain bin include the foreign grain beetle, psocids, and grain mites. Adult **foreign grain beetles** are brown, and about 2 mm long. They resemble the rusty grain beetle, but can be distinguished from it by club-shaped antennae. Also, when placed in a glass jar, foreign grain beetles will climb up the sides, while rusty grain beetles cannot. **Grain mites** are whitish, soft bodied, and about 0.2 to 0.5 mm long. They can be hard to see with the naked eye. About eight kinds of mites are common in farm granaries and elevators. **Psocids** are soft bodied insects, about 1 mm long, with long antennae relative to the body size.

Fungus feeding insects and mites cannot survive in dry grain. Chemical control is not necessary for fungus feeding pests in stored grain. Practices that result in the grain drying may be all that is needed to control such pests.

Control Techniques:

The Canada Grain Act states there is zero tolerance for any primary insects (those that feed on whole sound grain) in grain delivered to elevators. Outlined below are some control techniques and when and how these techniques can be best used.

Cold Temperatures. Rusty grain beetles are cold hardy and can survive subzero temperatures. Rusty grain beetles and other stored grain insects can be killed by reducing core grain temperatures as follows:

Grain Temperature	Time Required to Kill Insects
-5°C	6 weeks
-10°C	4 weeks
-15°C	2 weeks

It is important to note that maintaining core grain temperatures below 18°C will stop beetles from reproducing and laying eggs, and below 15°C will limit movement and feeding activities.

Phostoxin and Gastoxin.

Company: Degesch America Inc. (Phostoxin); United Agri Products (Gastoxin)

Formulation: 55 percent Aluminum Phosphide. These fumigants are available as pellets or tablets.

Insects controlled: Rusty grain beetle, red flour beetle, saw-toothed grain beetle, granary weevil, Indian meal moth, and yellow mealworm.

Approved for use on the following stored grains: Barley, corn, dried peas, lentils, oats, rice, rye, soybeans, sunflower seeds, triticale, and wheat.

The following table may be used as a guide to determine the minimum length of exposure period to phostoxin and gastoxin at the indicated temperatures:

Temperature	Exposure Period
Below 5°C (40°F)	Do not fumigate
5°C – 12°C (40°-53°F)	10 days
13°-15°C (54°-59°F)	5 days
16°-20°C (60°-68°F)	4 days
above 20°C (68°F)	3 days

If the grain is less than 5°C then the tablets will not release the gas until the grain temperature warms up. This may result in poor control and accidental exposure to phostoxin or gastoxin at a later date in grain handling facilities. Very dry grain will also slow the release of the gas from the pellets.

Protect-It.

Company: Hedley Technologies Inc.

Formulation: 90 percent Diatomaceous Earth (DE) and 10 percent Amorphous Silica

Insects controlled: Rusty grain beetle, rice weevil, granary weevil, Angoumois grain moth, Mediterranean flour moth, Indian meal moth, red flour beetle, and Tribolium.

Approved for use on the following stored products: Feed grains, seed, stored grains, wheat, barley, buckwheat, corn, oats, rye, flax, peas, soybeans, and sorghum. Also registered for structural treatment of empty grain storage and transportation containers.

Protect-It must be applied to grain as it is being loaded into the bin. Protect-It damages the cuticle of the insect, reducing the insect's ability to retain moisture. The insect eventually dies from dehydration The grain must be warm enough for the insects to still be moving for the DE to be effective, and it is most effective when used in dry grain. Tough or damp grain (>16 percent moisture content) will provide insects with a humid environment, which diminishes the desiccating effect of DE. The application rate for Protect-It varies by crop and insect species, ranging from 100 g/tonne for control of rusty grain beetle in wheat to 1000g/tonne for red flour beetle in corn. Refer to the label for details. If desired, Protect-It treated grain can be processed or fed to livestock immediately after treatment.

The application of DE will lower the test weight measurement of the grain, but usually not to the point of downgrading. If test weight loss is excessive the grain can be diluted with untreated grain. DE is non-toxic to humans and animals.

Malathion Grain Protectant Dust.

Company: Interprovincial Co-operative

Formulation: 2 percent malathion

Insects controlled: confused flour beetles, flat grain beetles, granary weevil, Indian meal moth, lesser grain borer, rusty grain beetle and sawtoothed grain beetle.

Approved for use on the following stored grains: Wheat, rye, barley and oats as stored grains.

Malathion Grain Protectant can be applied to grain as it is being loaded into a bin or being turned by adding gradually at the grain auger. It can also be used to control surface infestations by applying to the grain surface and raking in to 15 cm depth of the grain. Malathion controls insects by ingestion and contact and insects must be active for it to be effective. Application rates vary for different crops from 415 g/1,000 kg for wheat to 735 g/1,000kg for oats. See the label for all crop rates. Do not apply to grain within 7 days of sale.

Be aware that the Canadian Grain Commission allows only 8 ppm of malathion residues in stored grains.

Malathion 500, Malathion 500 E, Fyfanon

Refer to labels for these products for insect and mite control in empty grain bins, grain elevators, grain box cars, and flour mills.

Addendum to the 2001 Guide to Crop Protection

Corrections:

***Page 162*: MCPA – *Tank Mixes*: Puma^{120} Super SHOULD NOT BE INCLUDED as a tank mix option for MCPA Amine in oats. PUMA^{120} SUPER WILL SEVERELY INJURE OATS TO THE POINT OF COMPLETE CROP DEATH.**

Page 49: **Accent** – When applied at the registered rate of 13.5 g/acre, one container of Accent (133.6 g) will treat 10 acres NOT 40 acres.

Page 51: **Accord** – *Tank mixes*: Accord tank mixes listed for Express Pack, Avenge, and Avenge/Accord mixes with Buctril M, 2,4-D, and MCPA are for spring wheat only.

Page 60: **Anthem** – *Weeds Controlled*: reference to SMART varieties should read CLEARFIELD varieties.

Page 134: **Glyphosate for RR Crops** – *Weeds Staging and Rates for RR Canola*: Control of proso millet is registered only for Roundup Transorb.

Page 132: **Glyphosate Pre-harvest** – *Rates*: Touchdown and Victor are not registered for pre-harvest use on forage and are restricted to application rates of 1 L/acre in annual crops. (Should have been placed in the same spot as Glyfos)

Page 146: **Horizon BTM** - *Weeds Controlled and Staging:* list of weeds should also include – Green foxtail (1 to 5 main stem leaves, prior to the emergence of the 3rd tiller), wild oat (1 to 6 main stem leaves, prior to the emergence of the 4th tiller)

Page 154: **Liberty** – *Rates and Weeds Controlled*: titles of columns reading from left to right should read "Weed – Rate (L/acre) – Acres Treated Per 13.5 L Container" (the bottom words in each column have shifted to the left one column.

Page 160: **MCPA**– *Crop Stage:* Second row-first column should read "Wheat (spring and durum), barley, oats." (Bottom line of that row in chart moved to right column)

Page 168: **Muster Toss-N-Go** – *Rates*: Footnote to the 12 g/acre rate – "High rate of Muster is for use in canola only. DO NOT USE ON CONDIMENT MUSTARD CROPS AS INJURY MAY RESULT.

Page 176: **Poast Ultra** – *Weed Stage*: Rate for 1 to 4 leaf stage application should be 0.13 L/acre.

Page 191: **Refine Extra Toss-N-Go** – *Weeds Controlled and Staging*: Add the following statement "Unless otherwise indicated, apply to young, actively growing weeds of less than 4 inches (10 cm) tall or across."

Page 205: **Sencor** – *Crop Stage*: The second line-left column of the crop staging chart should read Barley, spring wheat (the word wheat was displaced into the staging column)

Page 243: **Residual Herbicides Section** – add the line "PRESTIGE – See Curtail M and Attain."

Page 251: **Apron FL** – *Rates and Water Volumes*: Rate values for turf have moved to the left one column.

Page 252: **Apron FL** – *Rates for Crops to Be Exported*: Rates for Sunflowers have moved to the left by one column.

New Registrations

Page 50-51: **Accord** – *Tank Mixes*: Buctril M, 2,4-D, and MCPA mixes listed are now for use in spring barley.

Page 128: **Glyphosate** – *Tank Mixes*: Roundup at 0.5 to 0.77 L/acre plus 2,4-D amine or LV ester at 0.23 to 0.57 L/acre (for 500 g/L formulations – see 2,4-D page in Guide to Crop Protection for conversion to other formulation strengths)

Page144-145: **Horizon** – *Tank mixes*: Add MCPA 300 g/L Sodium Salt formulations at 0.48 to 1.09 L/acre; Lontrel at 0.17 to 0.34 L/acre; and Lontrel at 0.085 L/acre plus Refine Extra at 8.1 g/acre as registered mixes.

Page 154: **Liberty** – *Restrictions*: Liberty is registered for application to Liberty Link (glufosinate ammonium tolerant) canola varieties by air. Applications must be made in a minimum of 5 gallons per acre (23 L/acre) of water. A buffer zone of 30 m must be maintained between the downwind edge of the boom and wetlands and areas where sensitive plants are present.

Page 184-187: **Puma 120 Super & Puma Super** – *Restrictions*: Aerial Application: Puma 120 Super has been granted a temporary registration for application by air which expires on December 31, 2001. Puma Super and Puma 120 Super must be tank mixed with an eligible broadleaf tank mix partner for crop tolerance in barley. Check the Puma Super and Puma 120 Super labels for eligible tank mixes. Check the labels of the eligible tank mix partners for aerial registration and other restrictions. Do not apply within 100 m of wetlands or sensitive vegetation.

New Product Registrations

Absolute – Absolute is a pre-packaged tank mix of Odyssey and Lontrel for use in CLEARFIELD canola varieties only. See full product information section below.

Adrenalin – Adrenalin is a herbicide for broad-spectrum control of annual grasses and broadleaf weeds in CLEARFIELD wheat varieties only. Do not apply to any other variety of wheat as severe injury will result. The product details are not available at this time.

Frontline – Frontline contains florasulam, a new Group 2 herbicide, and MCPA ester for broad-spectrum broadleaf weed control in cereals. The product details are not available at this time.

K2 – K2 is a pre-packaged tank mix of Everest and Refine Extra for use in spring wheat (NOT including durum). See full product information section below.

Spectrum – Spectrum contains florasulam and clopyralid + MCPA ester for broad-spectrum broadleaf weed control in cereals. The product details are not available at this time.

Absolute

Herbicide Group – 2 and 4

Company:

BASF

Formulation:

Odyssey: 35 percent imazamox and 35 percent imazethapyr formulated as a dispersible granule, Container size – 2 x 173 g water soluble bags

Lontrel: 360 g/L clopyralid formulated as a solution, Container size – 2 x 3.4 L jugs.

Each case contains one 8.1 L jug of Merge.

Crops and Staging:

CLEARFIELD canola varieties from the 2 to 6 leaf stage. Apply **only** to CLEARFIELD canola varieties; application to any other variety of canola or any other crop will result in crop death.

Weeds Controlled and Staging:

Grasses:

Apply from 1 to 4 main stem leaves, until tillers are visible.

Barnyard grass
Green foxtail
Persian Darnel
Volunteer cereals (wheat, barley, oats)
Wild oats

Broadleaves:

Unless otherwise indicated, apply to broadleaf weeds up to 4-leaf stage.

Alsike clover
Canada thistle (rosette to pre-bud stage)*
Chickweed
Cleavers (up to 4 whorls)
Common groundsel
Flixweed
Golden Rod
Hemp-nettle
Kochia
Lamb's-quarters**
Perennial Sow-thistle*
Redroot pigweed
Russian thistle
Scentless chamomile
Shepherd's-purse
Smartweed
Stinkweed
Stork's-bill
Tufted vetch
Volunteer alfalfa
Volunteer canola (non-CLEARFIELD varieties)
Volunteer tame mustard
Wild Mustard
Wild buckwheat

*top growth control for 6-8 weeks
**suppression

Cost:

$29.95/acre (2001 suggested retail price).

Rate:
Odyssey: 8.6 g/acre
Lontrel: 0.17 L/acre
Merge at 0.5 L per 100 L of spray solution
One case treats 40 acres.
Do not apply more than once per year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Water Volume:
10 gallons/acre (45 L/acre).

Pressure:
275 kPa (40 psi).

Nozzles:
Flat fan nozzles calibrated for 20-40 psi. Use a 50 mesh or coarser screen and filter system.

How it Works:
Odyssey: Imazamox and imazethapyr are both systemic and are absorbed through foliage and plant roots and is translocated to growing points in plants. Symptoms appear in 3 to 10 days and include yellow striping on the newest leaves of grassy weeds, and yellowish, purplish, or reddish discolouration of the newest leaves of broadleaf weeds. Symptoms progress to older leaves and plant death occurs in 1 to 3 weeks.
Lontrel: Clopyralid is a growth regulator type herbicide that is absorbed through foliage and stems of the plant and is translocated to all parts of the plant. Symptoms include swollen growing points and roots, twisted stems and leaves, and a gradual discolouration from green to yellow to brown. Susceptible plants die in 2 to 3 weeks.

Effects of Growing Conditions:
Crops may be more susceptible to injury and weed control may be reduced when plants are under stress. Plants are under stress when environmental conditions cause them to cease actively growing before during or after application. These conditions can include very hot or cool temperatures, very wet or dry conditions, or attack by disease.

Tank Mixes:
Herbicides: None registered
Fertilizers: None registered.
Insecticides: None registered.

Restrictions:
Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.
Grazing: Do not graze treated crop or cut for feed prior to crop maturity
Pre-harvest: Do not apply within 60 days of harvest.
Recropping: The following crops may be grown safely the year following an application:
Clearfield canola, spring wheat and durum wheat. In the event of a crop failure during the year of application, only Clearfield canola should be grown. Conduct a field bioassay the year before growing any other crop than those listed above.
Aerial Application: Do not apply by air.
Storage: Do not freeze. Store in a cool, dry place above 5C.

Environment: Avoid spraying in situations where drift may occur. Leave a buffer zone of at least 14 m between the outside boundary of the sprayed area and sensitive areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs.

Hazard Rating:
Warning Eye Irritant

K2

Herbicide Group – 2
(Refer to page 20)

Company:
DuPont Canada Inc.

Formulation:
Refine Extra: 50 percent thifensulfuron methyl plus 25 percent tribenuron methyl formulated as a dry flowable. Container size: 4 water-soluble bags (80 g each, total 320 g).

Everest: 70 percent flucarbazone-sodium formulated as a water dispersible granule. Container size: 4 x 174g water-soluble packets.

Crops and Staging:
Spring wheat (NOT including durum) - Apply from 1 (expanded) to 4 main stem leaves up to two tillers. Injury may result if applied outside the recommended stages.

Caution: K2 MUST be applied with 2,4-D Amine (not supplied) at 0.35 L to 0.45 L/acre (based on 500g/L formulation) plus 0.25% v/v of a recommended surfactant. See 2,4-D for additional staging and application restrictions.

Weeds Controlled and Staging:
Grasses:
Apply at the 1 to 6 leaf (4 leaves on the main stem + 2 tillers)

- Wild oats
- Green Foxtail

Broadleaves:
Unless otherwise indicated, apply to young, actively growing broadleaf weeds that are up to 4 inches (10 cm) tall or wide.
When tank mixed with 2,4-D, K2 will control the following broadleaf weeds:

- Wild Buckwheat
- Burdocks (seedlings)
- Chickweed
- Cocklebur
- Common ragweed
- Common plantain
- Common groundsel
- Corn spurry
- Cow cockle
- False ragweed
- Flixweed
- Giant ragweed
- Green smartweed
- Hemp-nettle
- Kochia
- Lady's-thumb
- Lamb's-quarters
- Mustard (ball, hare's ear, Indian, tumble, wild, wormseed)
- Narrow-leaf hawk's-beard
- Pigweed (redroot, Russian)
- Prickly lettuce
- Russian thistle
- Shepherd's-purse
- Stinkweed
- Sweet clover
- Tartary buckwheat
- Volunteer canola
- Wild radish
- Volunteer sunflower

Weeds Suppressed:
Canada thistle (less than 6 inches (15 cm) tall or across and prior to budding)
Cleavers (1 to 3 whorls)
Round-leaf mallow (2 to 6 leaf)
Scentless chamomile
Sow Thistle
Stork's-bill (2-6 leaf)
Toadflax (less than 15cm tall)

Cost:
$19.65/acre plus cost of 2,4-D Amine and adjuvant.

Rates:
Refine Extra: 8g/acre
Everest: 17.4 g/acre
(One case treats 40 acres)

2,4-D Amine (not supplied) must be mixed with K2 at 0.34 to 0.45 L/acre (based on 500g/ L formulation)
Agral 90 or Ag-Surf at.0.25 L per 100L of spray solution

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13 of the 2001 Guide to Crop Protection.

Water Volume:
10 gallons/acre (45 L/acre)

Pressure:
200 to 345 kPa (30 to 50 psi)

Nozzles:
Flat Fan nozzles at 80° or 110°. Use of flood-jet or controlled droplet application equipment is not recommended.

How it works:
Everest - Flucarbazone-sodium is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing points of the plant. Growth of susceptible plants stops soon after application. Symptoms include discoloration yellowing, and eventually dark green) and complete control may take 2 to 3 weeks.

Refine Extra – Thifensulfuron methyl and tribenuron methyl are absorbed through foliage and translocated to growing points within the plants. Cell elongation is inhibited shortly after application preventing further growth of the weed. Symptoms include discoloration (yellowing, purpling, and reddening) of newest leaves and are visible in 1 to 3 weeks after application.

Effects of Growing Conditions:
Crop tolerance and weed control may be reduced if applications are made to plants growing under stress. Stress includes saturated or waterlogged soil, drought, extreme high or low temperatures, large fluctuations in daily temperature, low fertility or visible disease symptoms at application.

Tank Mixes:
Herbicides: K2 - MUST be applied with 2,4-D amine and a recommended surfactant.
Fertilizers: None registered. Do not mix soluble bags with liquid fertilizers.
Insecticides: None registered.

Restrictions:

Rainfall: Rainfall within 4 hours of application may reduce degree of weed control.
Grazing: Do not graze treated fields. Mature grain or straw may be fed to livestock.
Pre-harvest Interval: 80 days
Re-cropping Interval: The following crops may be planted 11 months after application: **Black, Dark Brown and Gray-Wooded Soil Zones**: spring wheat, barley, canola, and field peas. **Brown Soil Zone**: spring wheat.
Aerial Application: Do not apply by air.
Storage: Store in a cool, dry place. May be frozen but the water-soluble bags may become brittle and break if handled roughly.

Tank Cleaning:

Both components of K2 can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray K2 should be flushed out immediately before using another product. Follow the steps below:

1. Drain the tank and thoroughly rinse the spray tank, boom and hoses with clean water. Pay particular attention to flushing out any visible deposits.
2. Fill the tank with clean water and 1% v/v (1 L/100L) household ammonia. Flush the hoses, boom and nozzles with the solution. Circulate for at least 15 minutes. Flush hoses, boom and nozzles once more, then drain the tank.
3. All nozzles, screens and filters should be removed and cleaned after applying this product. Clean nozzles and screens in a separate container using the ammonia and water.
4. Repeat #2.
5. Rinse tank, boom and hoses with clean water.

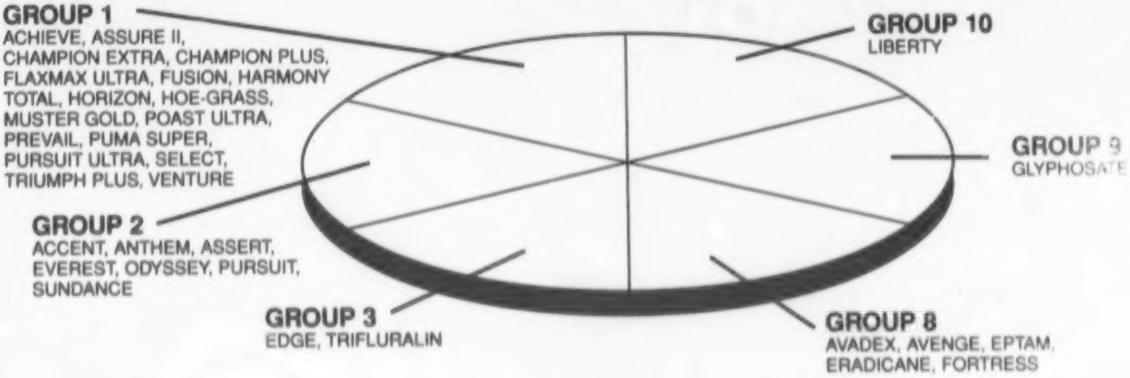
Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating:
Warning - Eye and Skin Irritant

HERBICIDE ROTATION - 2001

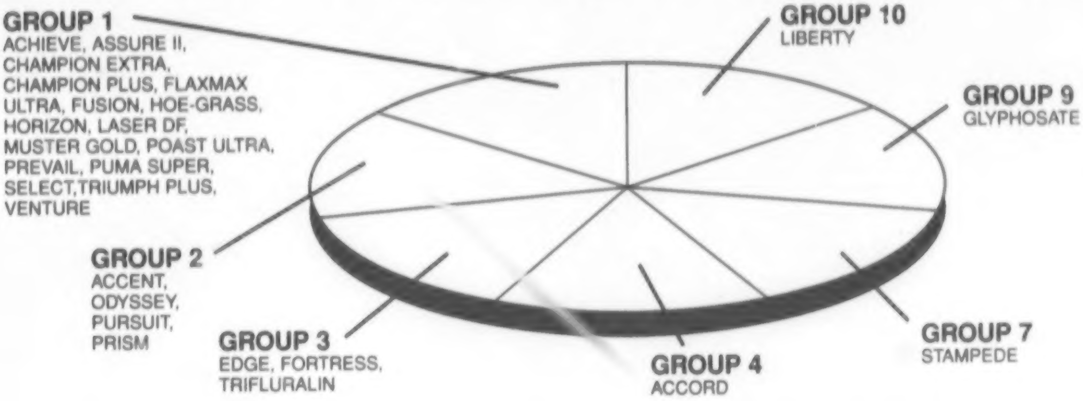
☐ ROTATING WILD OAT HERBICIDES

To delay the onset of resistance, do not use wild oat products from the same group more frequently than one year in th


GROUP 1
ACHIEVE, ASSURE II, CHAMPION EXTRA, CHAMPION PLUS, FLAXMAX ULTRA, FUSION, HARMONY TOTAL, HORIZON, HOE-GRASS, MUSTER GOLD, POAST ULTRA, PREVAIL, PUMA SUPER, PURSUIT ULTRA, SELECT, TRIUMPH PLUS, VENTURE
GROUP 10
LIBERTY
GROUP 9
GLYPHOSATE
GROUP 2
ACCENT, ANTHEM, ASSERT, EVEREST, ODYSSEY, PURSUIT, SUNDANCE
GROUP 3
EDGE, TRIFLURALIN
GROUP 8
AVADEX, AVENGE, EPTAM, ERADICANE, FORTRESS

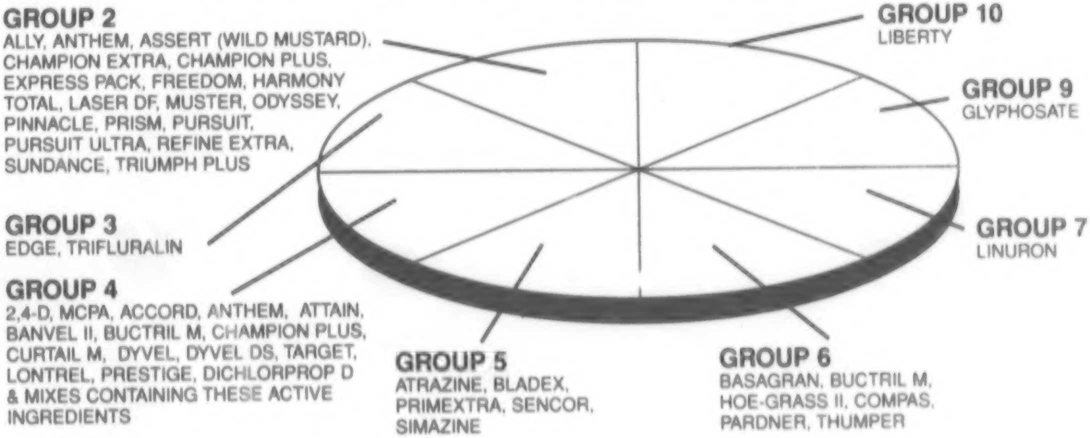
☐ ROTATING GREEN FOXTAIL HERBICIDES

To delay the onset of resistance, do not use green foxtail products from the same group more frequently than one year in t


GROUP 1
ACHIEVE, ASSURE II, CHAMPION EXTRA, CHAMPION PLUS, FLAXMAX ULTRA, FUSION, HOE-GRASS, HORIZON, LASER DF, MUSTER GOLD, POAST ULTRA, PREVAIL, PUMA SUPER, SELECT,TRIUMPH PLUS, VENTURE
GROUP 10
LIBERTY
GROUP 9
GLYPHOSATE
GROUP 2
ACCENT, ODYSSEY, PURSUIT, PRISM
GROUP 3
EDGE, FORTRESS, TRIFLURALIN
GROUP 4
ACCORD
GROUP 7
STAMPEDE

☐ ROTATING BROADLEAF HERBICIDES

To delay the onset of resistance, do not use broadleaf herbicides from the same group year after year on the same field.


GROUP 2
ALLY, ANTHEM, ASSERT (WILD MUSTARD), CHAMPION EXTRA, CHAMPION PLUS, EXPRESS PACK, FREEDOM, HARMONY TOTAL, LASER DF, MUSTER, ODYSSEY, PINNACLE, PRISM, PURSUIT, PURSUIT ULTRA, REFINE EXTRA, SUNDANCE, TRIUMPH PLUS
GROUP 10
LIBERTY
GROUP 9
GLYPHOSATE
GROUP 3
EDGE, TRIFLURALIN
GROUP 7
LINURON
GROUP 4
2,4-D, MCPA, ACCORD, ANTHEM, ATTAIN, BANVEL II, BUCTRIL M, CHAMPION PLUS, CURTAIL M, DYVEL, DYVEL DS, TARGET, LONTREL, PRESTIGE, DICHLORPROP D & MIXES CONTAINING THESE ACTIVE INGREDIENTS
GROUP 5
ATRAZINE, BLADEX, PRIMEXTRA, SENCOR, SIMAZINE
GROUP 6
BASAGRAN, BUCTRIL M, HOE-GRASS II, COMPAS, PARDNER, THUMPER